

NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 6, Number 13

An IDG Communications Publication

April 3, 1989

GE Tariff 12 net provides integration

By Anita Taff
Washington Bureau Chief

BRIDGEPORT, Conn. — When Stanley Welland, manager of corporate telecommunications at General Electric Co. here, set out to build a network that would lure company divisions back to the corporate backbone, he never suspected he would play a major role in AT&T's controversial Tariff 12.

Welland's efforts to convince AT&T to provide a digital electronic tandem network for GE's 1,300 locations brought the commercial value of Tariff 12 to AT&T's attention.

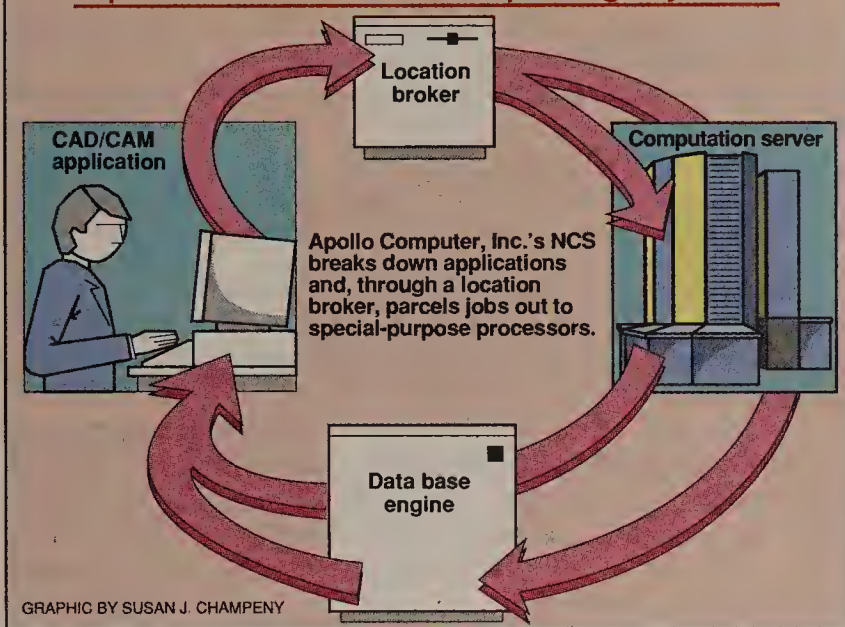
The carrier had originally devised Tariff 12 solely to meet the needs of a Department of Defense contract.

Welland became involved with Tariff 12 in 1986, when he began researching potential solutions to GE's pressing network needs.

Network procurement at GE had become so decentralized that, of all the traffic generated by the company and its 14 business divisions, only 30% to 40% was carried on the company's analog tandem backbone. GE had some 40 separate data networks.

Today, after 2½ years, considerable legwork and innovative thinking on Welland's part, the company has a digital tandem network consisting of more than
(continued on page 51)

Apollo's Network Computing System



Apollo NCS lacks software but still draws followers

Company expects software developers to aid users' noble application development efforts.

By John Cox
Senior Editor

CHELMSFORD, Mass. — Apollo Computer, Inc.'s Network Computing System (NCS) turned two years old last month, but few users have adopted the technology because only a handful of NCS-compatible applications exist, and most of those were developed by Apollo.

The dearth of applications leaves users with little choice but to pioneer program development on their own. Those who have taken on the task have found the effort worthwhile.

NCS networks "can be treated as one giant computer," said Tom

Pierce, senior scientist, computer applications research at Rohm & Haas Co., a Philadelphia-based specialty chemical firm. "All the standard programming optimization problems and priorities are the same, except you treat the whole network as the computer."

NCS lets programmers break apart applications and run pieces of them on different computers in a network. Benefits include faster processing, because multiple CPUs work on a single problem, and optimized use of processors, because spare CPU cycles are put to work.

Third-party software develop-
(continued on page 50)

FCC ruling to open 800 service options

Decision ends 3-year investigation into potential public benefits of RBHC 800 data base services.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The Federal Communications Commission voted last week to allow the regional Bell holding companies to develop data bases supporting new toll-free 800 calling services, closing a controversial three-year investigation.

The data bases will enable RBHC customers to use a single 800 number with multiple long-haul carriers, change carriers throughout the day to take advantage of different rates and limit the use of 800 numbers to specific geographic locations, according to the FCC.

Although most participants in the investigation believed RBHC 800 data bases would benefit users, some were concerned about problems associated with call setup delay, the recovery of development costs and whether the RBHCs should be allowed to offer optional features.

The FCC decision addressed some of these concerns by allowing the RBHCs to begin data base development, but it requires local carriers to continue routing 800 calls to interexchange carriers using current techniques until Common Channel Signaling System 7 (CCS7) becomes generally available.

Without the out-of-band signaling capabilities of CCS7, the setup time for 800 calls would more than quadruple, from two to nine seconds. The FCC concluded that a nine-second delay
(continued on page 50)

INSIDE



Texaco gains networking edge, page 19.

Apple shows token-ring link for Mac

By Susan Breidenbach
West Coast Bureau Chief

CHICAGO — Apple Computer, Inc. last week ushered customers behind closed doors at the Macintosh Connectivity Conference here for a peek at its long-awaited Macintosh token-ring interface, scheduled to debut within 60 days.

The NuBus-compatible Macintosh TokenTalk interface is designed to be used as a gateway linking Macintoshes in an AppleTalk environment to token-ring networks, according to sources who previewed the product.

Users have been waiting for an interface since 1987, when Apple pledged token-ring support. Last July, sources indicated the product would ship in September. At that time, Apple officials would not confirm the shipment dates
(continued on page 47)

NETLINE



CODEX LOOKS TO make a splash in the X.25 arena with three new switches. Page 2.

EDS PONDERs the benefits of implementing SS7 in its private network. Page 2.

CHANGE TARIFF 12 or else, says the FCC's Common Carrier Bureau. Page 6.

MIXED MEDIA architecture: A *Network World* feature compares DEC's CDA to the efforts of competitors and to OSI. Page 28.

KENDALL CO. OPTS for a distributed network based on IBM's AS/400 to replace its old hierarchical mainframe topology. Page 46.

FEATURE



New standard needed for multimedia applications

By Steve Guengerich
Special to Network World

Text, data, facsimile, video, three-dimensional graphics and voice all travel through networks today. Unfortunately, each of these media requires specialized software or hardware for input and output.

One of the principal challenges facing hardware and software developers is to integrate these diverse types of business informa-

tion so that people can communicate using several media simultaneously.

User demand for mixed-object, or multimedia, applications and workstations is on the rise. However, the focus of product developers so far has been on the use of separate new technologies, such as laser disks, animated digital graphics, hypertext, and speech synthesis and
(continued on page 33)

MANAGEMENT

UPDATE

Codex pumps up net line with X.25 packet switches

Will unveil entry-level devices and announce U.S. availability of high-end Model 6600 switch.

By Paul Desmond
Staff Writer

CANTON, Mass. — Codex Corp. is expected to announce this week two entry-level X.25 packet switches and a high-end switch as part of a new effort to become a major player in the packet network market.

Analysts said the X.25 products are a necessary addition to the company's line of network offerings, which includes statistical, time-division and T-1 multiplexers, as well as net management systems and modems.

A Codex spokesman acknowledged the company's plan to unveil the switches but said the introductions will be secondary to disclosure of Codex's strategic X.25 plans. He declined to offer details about the products.

But Larry Cynar, an analyst with Dataquest, Inc., a San Jose, Calif.-based consultancy, said Codex will roll out two low-end X.25 packet switches, one of which will support packet assembler/disassembler functions.

The switches will support up to 48 ports and are designed for either entry-level X.25 networks or to feed traffic into X.25 backbones, Cynar said.

It is not clear how the products will differ from Codex's existing 6742 and 6745 Flexible Networking Exchanges or its 6510 Intelligent Network Processor, the company's current entry-level packet switches.

Codex will also announce the U.S. availability of its high-end packet switch, the Model 6600, Cynar said. Codex has been selling the switch, which is made by

Hughes Network Systems, Inc., in Europe since 1987, he said. The 6600 supports hundreds of lines and is geared toward users with massive networks.

All three products are expected to be tied in with Codex's existing 9300 Series and 9800 Series net management systems, which support the company's modems and statistical multiplexers. The 9800 also offers limited support for Codex's 6290 Integrated Digital Exchange T-1 multiplexer, a StrataCom, Inc. product that Codex resells.

Although they would not discuss details of the products, analysts briefed on the products said the packet switches boost Codex's effort to widen its product line.

"Codex is going into packet switching in a big way," said Jack Freeman, senior data communications analyst with The Yankee Group, a research and consulting firm in Boston. "It's a very good move for Codex because I believe they can't survive selling low-end products like stat muxes and modems that are fast turning into commodity items."

"Their timing is very important," Cynar said. "Last year, domestic modem sales were flat to declining."

Codex should be able to ride its reputation for quality products and support into the packet switch market, the analysts said.

"They do good systems engineering, and they support their customers extremely well," Freeman said. "They have built up a loyal customer base of very satisfied users." □

EDS weighs installation of SS7 in private network

GM's voice/data fiber net targeted for upgrade.

By Bob Wallace
Senior Editor

WASHINGTON, D.C. — Electronic Data Systems Corp. (EDS) is considering installing CCITT Signaling System 7 (SS7) in General Motors Corp.'s private voice/data network, which would make GM one of the first private network users to implement SS7.

EDS, which is owned by GM, said SS7 would enable it to drastically reduce call setup time and decrease the number of circuits in its T-3 fiber-optic backbone network by more than 15%.

Although AT&T, MCI Communications Corp. and US Sprint Communications Co. are implementing SS7 in their nets, GM would become the first user to im-

plement SS7, EDS said.

"We are seriously considering using SS7 in the GM network, but we have yet to justify it," said Daniel Corcoran, a manager with the EDS Communication Services Division (CSD), speaking at the second annual T-1 Users Association Conference and Expo 1989 here last week (see "GM migrates to SDN in net optimization plan," page 47).

The Independent T-1 Users Association and TeleStrategies, Inc., a McLean, Va.-based consulting research and exposition group, cosponsored the event, which drew 150 users representing about 40 corporations and organizations.

(continued on page 47)

Briefs

MCI, AT&T plan rate cuts. MCI Communications Corp. said last week it plans to reduce basic long-distance rates for business and residential customers by an average of 4%, or \$200 million a year, effective this week. The move reflects a recent Federal Communications Commission ruling in which the agency cut the access charges long-haul carriers must pay to local telephone companies.

AT&T, which recently filed a tariff to reduce its rates in response to the FCC ruling, said last week that higher than expected access charge reductions permitted it to file for slightly steeper rate cuts than previously announced.

AT&T said new plans call for it to cut rates by about 1.7%, or \$637 million a year, as opposed to its initial planned reductions of 1.6%, or \$533 million.

A spokesman for US Sprint Communications Co. said the carrier has not changed its rates in response to the FCC ruling but "will do what it has to do to stay competitive."

AT&T files FTS 2000 rates. AT&T last week disclosed the rates it will charge the government for Federal Telecommunications System (FTS) 2000 services in a filing with the Federal Communications Commission.

The pricing information, filed after the FCC rejected AT&T's request to keep prices secret, was detailed in seven volumes totaling about 2,000 pages.

An AT&T executive two weeks ago summarized FTS 2000 prices for switched voice services on high-density routes, saying they will be below 13.5 cents

per minute ("AT&T reveals rates for FTS 2000 deal," NW, March 27).

MCI gets zapped. MCI Communications Corp. is still smarting from a service outage two weeks ago caused when a lightning bolt struck an underground fiber cable running from Mobile, Ala., to Baldwin, Fla. The lightning downed 36 T-3 circuits that have the capacity to carry 24,000 channels, according to an MCI spokesman.

To make matters worse, when the carrier attempted to route traffic around the downed link, it overloaded switches in seven cities, causing phone service to be severely delayed or blocked for up to two hours. The switches were located in Atlanta, Baldwin, Cleveland, Miami, Philadelphia, St. Louis and Washington, D.C.

MCI is redesigning emergency rerouting patterns so that customer traffic gets priority over interswitch signaling traffic, the spokesman said.

Let's go CERFing. The California Education and Research Federation Network (CERFnet), armed with a \$2.8 million grant from the National Science Foundation, is adding links to 38 California research institutions.

CERFnet, which already links the San Diego Supercomputer Center with four campuses of the California State University, will be expanded to provide high-speed access to national and international networks for other California academic, government and industrial research facilities. CERFnet membership is available to all California organizations.

CONTENTS

Industry Update

U.S. suppliers of network equipment and services are gearing up to compete in the post-1992 open European market. **Page 9**

Telecommunications

Blue Cross & Blue Shield of South Carolina is fine-tuning two new voice-response systems designed to free workers from routine phone inquiries, reduce telephone charges on incoming 800 calls and improve customer service. **Page 13**

Data Communications

United Stationers is taking advantage of a new breed of local net/wide-area net interface — the so-called router — to help it off-load mainframe processing tasks to personal computer local networks. **Page 15**

Local Networking

The high cost of FDDI products is driving users to build FDDI backbones linking local networks instead of adopting the technology at the departmental level. **Page 17**

Management Strategies

What happens when, for whatever reason, the chief network executive of your company leaves? **Page 19**

Products & Services

DA Systems will announce this week a service that enables users of various public or private E-mail systems to exchange binary and ASCII files. **Page 23**

Inside

Opinions	24
Letters	25
Networking Marketplace	37
Networking Careers	38
Calendar	51

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Framingham, Mass. 01701-9171
(508) 820-2543

Second-class postage paid at Framingham, MA, and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue the last two weeks in December by Network World Publishing/Inc., 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-620-7760.

Non-qualified subscribers: \$3.00 a copy; U.S. — \$95 a year; Canada, Central & South America — \$110 a year; Europe — \$165 a year; all other countries — \$245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label appearing on front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106.

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POSTMASTER: Send Change of Address to *Network World*, Box 9172, Framingham, Ma. 01701-9172.

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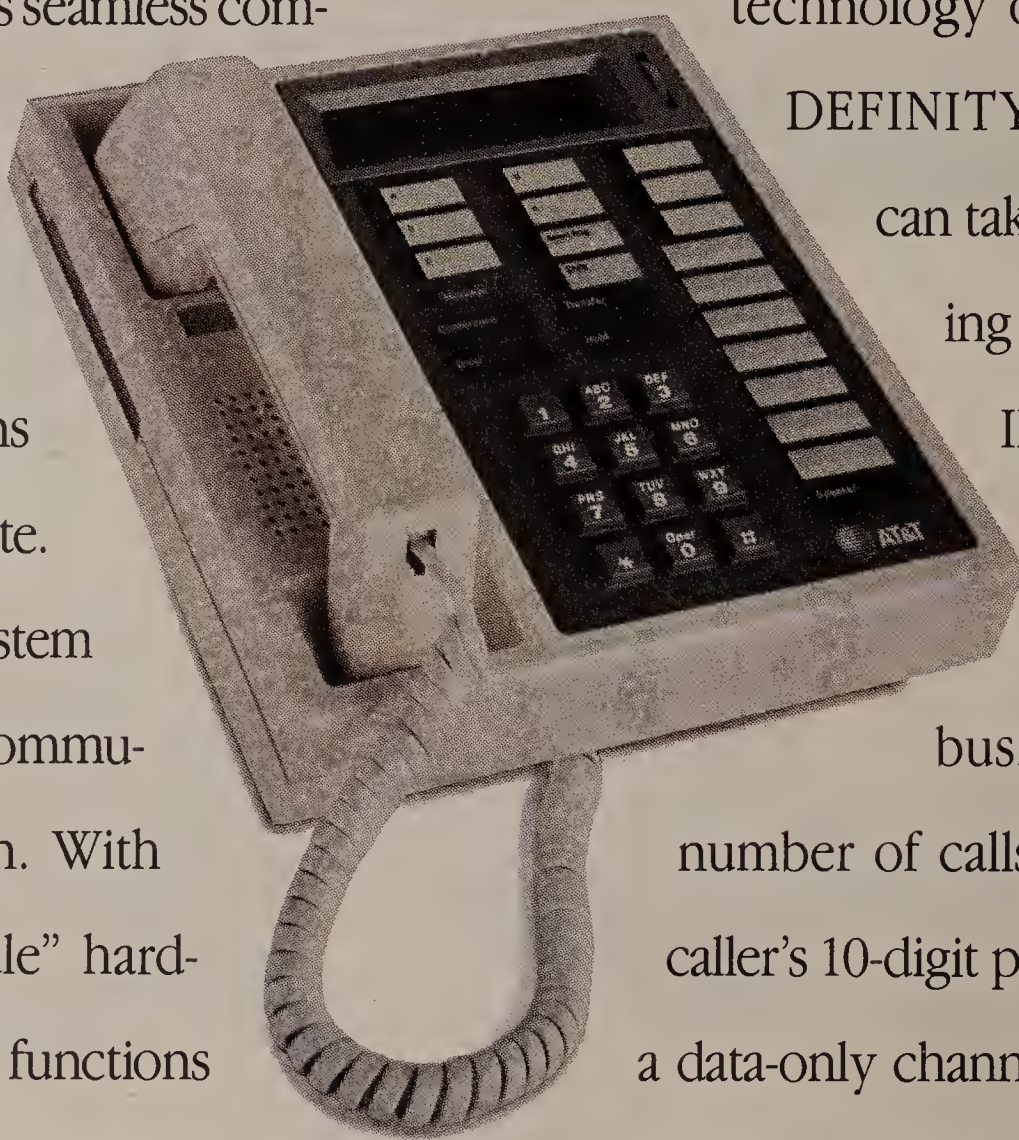
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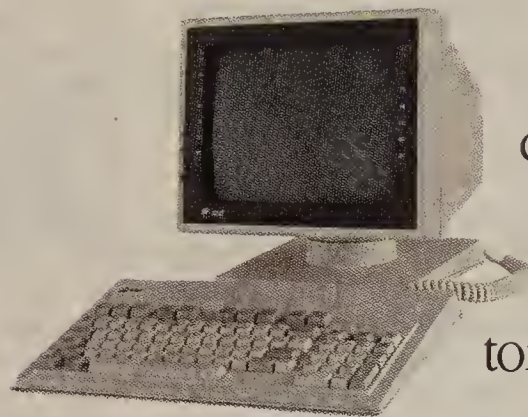
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Novell, Fox build DBMS to support both SQL, dBase

Joint effort aimed at more efficient applications.

Senior Editor

BOSTON — Novell, Inc. and Fox Software, Inc. last week announced a joint effort to build data base server software that supports both SQL and dBase languages on NetWare local nets.

FoxServer will integrate an enhanced version of Novell's NetWare SQL server-based data base software with FoxBase, Fox Software's dBase language, said Nan-

cy Woodward, Novell product development manager.

FoxServer will run on dedicated DOS-based servers and enable independent software vendors to write applications that give users of Fox's data base management software access to the functionality of a NetWare SQL file server, said Richard Ney, Fox's director of marketing.

If software developers adopt

“We’re developing a language that is a superset of NetWare SQL and FoxBase.”

▲▲▲

FoxServer, NetWare users will be able to draw upon a supply of applications that are more efficient than existing data base programs, Woodward said.

Other data base software vendors have traditionally viewed dBase and SQL as two separate languages.

That approach requires a mechanism to translate between dBase and SQL to accomplish desired tasks, Ney said.

“By contrast, we see NetWare SQL as a natural extension of our own FoxBase,” Ney said. “Rather than having two separate languages, we’re developing a hybrid language that is a superset of both NetWare SQL and FoxBase.”

Since translations between dBase and SQL commands are no longer needed, users will not experience the performance degradation usually associated with such translations on other systems, Fulton said.

FoxServer will work in conjunction with FoxPro, Fox Software's newest relational data base management system, which resides in workstations. FoxPro is expected to begin shipping this summer.

Additionally, FoxServer will support NetWare SQL's application program interface (API) called XQL, a set of programming rules and procedures. This will let Fox Software's 125,000 installed base of users gain access to other front-end data base systems now available for NetWare SQL, such as Lotus Development Corp.'s Lotus 1-2-3 and GUPTA Technologies, Inc.'s SQL Windows.

While FoxServer will initially support only DOS-based workstations, the two companies said they intend to support other workstations, such as Apple Com-



Novell's Nancy Woodward

puter, Inc. Macintoshes.

First OEM

Fox Software is the first company to market NetWare SQL on an OEM basis, Woodward said. The joint development agreement calls for Fox to market, distribute and provide all service and support for the FoxServer data base server.

The agreement with Fox Software differs from Novell's earlier NetWare SQL agreements with companies such as Relational Technologies, Inc. and GUPTA

“Fox and Novell are working together to put additional functionality in the server.”

▲▲▲

Technologies. Under those pacts, the other software vendors designed their applications for the standard NetWare SQL interface, Woodward said.

“In this agreement, Fox and Novell are working together to put additional functionality in the server so they'll have access to an interface that is an optimized version of NetWare SQL's API,” Woodward said.

All of the previous Novell partnerships require users to buy the front-end data base server from a particular software vendor and purchase the back-end NetWare SQL server from Novell. “The agreement gives users a one-stop source for the product and all service and support,” she said.

FoxServer is scheduled to ship in January. Pricing has not yet been set. □



PHOTOS ©1989 JOHN OWENS

Fox Software's Richard Ney

Common Carrier Bureau calls for Tariff 12 rejection

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The Federal Communications Commission's Common Carrier Bureau has urged rejection of Tariff 12 unless AT&T agrees to revise the custom network plan, sources told *Network World* last week.

The FCC has scheduled a public meeting tomorrow to decide the legality of Tariff 12, which allows AT&T to offer custom networks that bundle voice and data services together at a discounted price. At that meeting, the FCC commissioners will evaluate the Common Carrier Bureau's recommendation, which was circulated earlier this month.

According to a source at the FCC who spoke on the condition of anonymity, the recommendation urged rejection of the tariff because it is not generally available to all users.

“The view of the bureau staff and others, including the general counsel's office, was that, as presently constituted, it wouldn't make it. AT&T must know by now that, absent some kind of revisions, they're not going to get Tariff 12,” the source said.

Frank Patella, deputy chief of the tariff division in the Common Carrier Bureau, declined to com-

ment on whether staff members had recommended rejecting Tariff 12 unless it is revised. However, he acknowledged that bureau members feel the tariff needs improvement. “[The bureau] is not satisfied with the tariff filing exactly as it is,” he said.

Despite a negative recommendation from the Common Carrier Bureau, FCC commissioners could still approve Tariff 12 or work with the bureau to reach a compromise. “Under virtually any scenario, there will probably have to be some revisions [to Tariff 12], whether the commission goes with the staff document or goes some other route,” a staff member of one of the commissioners said.

According to FCC sources, the commissioners are likely to either allow AT&T to continue offering Tariff 12, subject to some conditions, or reject the tariff but suggest ways in which it could be revised to meet approval.

A final decision on Tariff 12 had not been reached by the agency late last week, but the commissioner's aide speculated that the agency was leaning toward rejecting the tariff with suggestions on how to revise it. If this happens, the source emphasized that AT&T would be allowed

to continue providing Tariff 12 services until the revisions could be made. “This [rejection] wouldn't mean that [AT&T] would have to pull down all their lines. We don't want to tear up the world here,” the source said.

Staff members of the Common Carrier Bureau, which generally decides tariff issues, are said to question the legality of AT&T offering special prices and conditions on a user-by-user basis. Such arrangements may violate provisions of the Communications Act of 1934 that prohibit discriminatory pricing and mandate that AT&T make services available to all customers.

Opponents of Tariff 12 argue that it allows AT&T to bundle existing services at discount prices for large customers while charging other customers higher prices for the same services sold separately. They say Tariff 12 services are so tailored to an individual customer that it would be almost impossible for any other customer to meet the same requirements for a custom network.

AT&T has argued that any customer that can commit to the same traffic volume and conditions as one of the Tariff 12 customers, all of which are very large corporations, can get similar customized network deals.

It was not clear last week what type of revisions to Tariff 12 the FCC was seeking, but at least two ideas were being discussed. AT&T (continued on page 47)

Value-added net provider in Japan preps int'l service

K-Network International will offer its customers data transmission, E-mail services to U.S., UK.

IDG International News Service

OSAKA, Japan — K-Network International, Inc., a value-added network provider based here, said last week it will launch international service to the U.S. and UK on April 26.

The company initially plans to offer international data transmission and electronic mail services to its current Japanese customers, according to Masahiro Tsujimoto, the company's deputy sales manager. The company counts British Telecommunications plc, Matsushita Electric Industrial Co., Sumitomo Electric Industries, Ltd. and Kansai Electric Power Co., Inc. among its 28 investors.

Tsujimoto said the carrier will provide such capabilities as protocol conversion, transmission rate conversion and data storage in conjunction with its data network services. It will also provide translation and multipoint distribution capabilities with its E-mail service.

Expansion on horizon

“In the near future, our service will be expanded to include most of the value-added network services, except data base and facsimile services,” Tsujimoto said.

Japan's Ministry of Posts and Telecommunications currently does not allow value-added net-

work providers to offer those services.

K-Network is scheduled to sign an agreement with McDonnell Douglas Network Systems Co.'s Tymnet, a leading data network provider in the U.S. In addition, the company is reportedly negotiating with Telenet Communications Corp. to expand its network service in the U.S.

The firm, established in December 1987, predicts sales of \$4 million to \$4.8 million by 1990.

Effects of ISDN

K-Network is concerned about the impact that full-scale Integrated Services Digital Network services will have on its value-added network offerings, Tsujimoto said.

Japan's Kokusai Denshin Denwa Ltd., which currently has a monopoly on external telecommunications, has announced it will launch international Basic Rate Interface ISDN service this summer in collaboration with AT&T and British Telecom. The company also announced it will link its domestic ISDN service with that offered by Nippon Telegraph and Telephone Corp. in the fall.

“If those giant common carriers could provide the public digital network services less expensively,” Tsujimoto said, “they would be too strong for us.” □

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Xerox net technology will help utilize idle resources

Spawn will reduce conflicts for computer time.

By Bob Brown
Senior Writer

PALO ALTO, Calif. — Researchers at Xerox Corp.'s Palo Alto Research Center last week published a paper detailing the development of a new technology that promises to dramatically increase network efficiency by reducing idle computer time.

Incorporated into products for corporate networks, the technology would give users automatic access to idle computers in the network, and it would reduce conflicts between users needing access to the same networked computers. The technology could also help users maximize their investment in specialized processors by making it easier for them to share the machines.

The Xerox network technology, called Spawn, was developed to help users deal with the increasing size and complexity of heterogeneous computer networks, said Bernardo Huberman, a Xerox physicist coordinating the project. Huberman is part of a five-man Xerox team that prepared the paper titled "Spawn: A Distributed Computational Economy."

The Spawn technology, which would be incorporated into communications software, has been under development for more than a year.

"Take a walk through any building where computers are being used in a network, and you'll notice that many of the computers are idle," Huberman said. "Spawn is a good way of utilizing

idle resources."

Huberman said users can no longer rely on a single processor, such as a mainframe, to coordinate network operations. Because of the distributed nature of networks, users need more control at each computer. Spawn software could be loaded onto individual workstations or network servers and other processors that would be accessible to users.

Sold to the highest bidder

The Spawn system is designed to let users automatically bid against one another for time on any computer in a network. Currently, users must go through time-consuming manual processes to access other computers on a network and are often frustrated by traffic jams caused by other users looking to utilize the processor.

Within the Spawn "market economy," each user on a network is given a budget of computer time, Huberman said. Every time a computer becomes idle, it sends a message to other devices on the network that it is free.

When users decide to make a bid to disperse their workload throughout a network, they can look in their mailbox to see which computers are idle, Huberman said. Users bid for time on other computers in accordance with the importance of their transactions and without the knowledge of what other users have bid.

The price at which time on a computer is "sold" is determined by "market demand"; those users

with the greatest priority will be allowed to use a processor first. No fee is charged when only one user is bidding for the right to use a computer on the network.

Spawn is being tested on an Ethernet supporting Digital Equipment Corp. VAX computers and Sun Microsystems, Inc. workstations. It could be adapted to work with other network architectures and other types of computers without much trouble, Huberman said.

There are a number of ways in which Spawn could benefit a company's network users, Huberman said. For example, users who want to search a large data base would be able to parcel out the work to other computers so that they could continue working on other tasks.

The Spawn system would also allow a user to take advantage of computers in a wide-area network that spans the world, Huberman said. A user in one country could use idle processors in another part of the world where the business day is through, he said. While the communications costs in this example could be prohibitive, some high-priority tasks might warrant such network usage, he added.

Improving network efficiency and computer usage could allow companies to buy fewer expensive computers with advanced features that most network users rarely need, Huberman said.

Huberman said he did not know when the Spawn technology will be ready to move from the research lab to the commercial marketplace, but he pointed out that some of the technology "is ready to fly."

The Spawn research team also includes Xerox's Carl Waldspurger, Tad Hogg, Jeffrey Kephart and Scott Stornetta. ■

Standard to put a dollar value on info

By Barton Crockett
Senior Editor

BOSTON — The Information Systems Security Association (ISSA) has established a committee that plans to publish the first standard procedure for assigning a monetary value to information in a computer.

Establishing the value of information could help network managers calculate how their companies would be hurt by network outages and make it easier to justify network protection expenditures to senior management.

The group, called the Corresponding Committee on Information Valuation, detailed its plans to develop a standard information valuation procedure at the ISSA's annual meeting here last week.

There is no widely accepted means today for valuation of information in computers, according to Will Ozier, chairman of the Corresponding Committee on Information Valuation and president of San Francisco-based security consultancy Ozier, Perry & Associates.

"We're spending billions and billions of dollars on information and haven't yet figured out a standard way to value this," Ozier said.

Committee members said the group is trying to construct a procedure by which users could have top executives estimate how much money their firm would lose if certain information, such as telemarketing lists or payroll data, was not available. These estimates would be factored in with estimates of how much it would cost to replace lost information and the potential damage to a company if critical data were acquired by competitors.

The ISSA plans to publish and distribute the standard procedure for valuation of information at its annual meeting in March 1990.

Eventually, according to Richard Rueb, executive director of the ISSA, committee members expect the procedure to become a standard accounting technique that could be used to calculate information assets, just as other assets are calculated.

Representatives from two major accounting firms, Ernst & Whinney and Deloitte Haskins & Sells, Co. are among the 35 committee members.

Placing a monetary value on information would also enable companies to plan their information systems expenditures more efficiently, according to Ed Koss, director of software systems at Emhart Advanced Technology, Inc., an aerospace subcontractor in El Segundo, Calif.

"I figure 10% of the information in a company's computer systems is what you could term critical, and the other 90% is data glut," Koss said. "Going through and putting a value on this information will help firms do a better job of figuring which data they want to collect and save, and which data isn't worth it." ■

3Com to support multiple protocols in 3+Open nets

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — 3Com Corp. last week announced an enhancement that will enable its 3+Open network operating system to concurrently support multiple communications protocols.

Demand Protocol Architecture (DPA) is a planned software enhancement to 3+Open that will let users load and unload different net protocols on the fly, without having to reboot the net.

Users will be able to select among IBM's Network Basic I/O System, Xerox Corp.'s Xerox Network Systems, Transmission Control Protocol/Internet Protocol and Open Systems Interconnection protocols, designating one as a primary protocol and another as a secondary protocol. Both protocols reside in workstation memory, enabling 3+Open to toggle between them.

DPA will make it easier for 3+Open networks to communicate with networks supporting different transport protocols because the network operating system will identify what protocol is needed to communicate with the other network.

"DPA makes multiple protocols available to the user on demand," said Jay Misra, 3Com's product manager for 3+Open.

3Com will deliver DPA either in the third or fourth quarter, along with other enhancements.

Variations on 3Com's multi-protocol support strategy have been offered before by other vendors. BICC Data Networks, Inc. of Westborough, Mass., has been pushing the concept of dynamic protocol swapping on local networks with its Multiple Protocol Support software package.

The software runs in workstations and lets local net users toggle between Novell, Inc.'s Internetwork Packet Exchange, Sun Microsystems, Inc.'s Network File System, TCP/IP, Microsoft Corp.'s MS-Net and OSI protocols.

3Com is taking a different tack with its DPA software. Instead of requiring the workstation or server to handle protocol conver-

sion, the operating system will transfer data in the receiving network's native protocol.

"3Com's DPA is running the multiple-protocol stacks native in a server," said David Perrott, an analyst at Dataquest, Inc., a market research firm in San Jose, Calif.

That distinction will become important when the Government OSI Profile comes into play in 1990, Perrott said. At that point, local network vendors that cannot provide server-level support for OSI transport protocols may find themselves locked out of most government contracts.

"DPA makes multiple protocols available to the user on demand," said Misra.

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3Com said it would like Microsoft to include DPA in the basic version of LAN Manager. Both companies coproduced LAN Manager, which has 40 licensees.

DOS software for 3+Open

3Com announced DPA along with new software for DOS workstations on a 3+Open net that takes up less memory than previous versions, leaving more memory for applications. 3Com shaved 80K bytes off the software by developing a new NETBIOS protocol.

When the new 3+Open software shell and DOS are loaded into a workstation equipped with 640K bytes of memory, there will be at least 520K bytes left for applications.

This compares to about 440K bytes in the current 3+Open environment and well under 400K bytes running under 3+.

The new software, which is only for 3+Open, will be prereleased to selected customers within 60 days. ■

Correction: The story "US Sprint's Esrey on long-haul challenges" (NW, March 27) incorrectly stated the percentage of GTE Corp.'s interest in US Sprint Communications Co. that United Telecommunications, Inc. agreed to acquire. United Telecom agreed to buy 30.1% of GTE's share in US Sprint and has an option to buy the remainder of GTE's stake by the end of 1995.

Clarification: The story "ISDN pilot test woes don't trouble users" (NW, March 27) reported that the Massachusetts Institute of Technology encountered distance limitation problems when it installed an ISDN-compatible AT&T 5ESS switch last fall. However, the problems were identified and resolved by AT&T three months before the switch was cut over.

Also, the story said many of MIT's ISDN-ready telephones temporarily failed to work. The university actually encountered problems with only about 1% of its phones.

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

BBN Communications Corp. of Cambridge, Mass., last week said it has been certified by the National Institute of Standards and Technology (NIST) to perform conformance testing of Defense Data Network (DDN) X.25 implementations. All products seeking host access to DDN via a DDN Standard X.25 interface are required to undergo conformance testing at a NIST-certified facility.

Merger activity increasing dramatically, study shows

Acquisitions and mergers grew by 35% in '88.

By Bob Brown
Senior Writer

FORT LEE, N.J. — The information technology industry last year witnessed a 35% increase in the number of mergers and acquisitions, according to information released by Broadview Associates.

About 773 such transactions worth some \$23.8 billion took place in 1988, according to the investment banking firm, based here. That compares to 574 transactions in 1987. Broadview Associates did not calculate a monetary value for the mergers and acquisitions in 1987.

About 43% of the total value of the 1988 mergers and acquisitions in the information technology industry came from the hardware and related services sector, said Broadview Associates partner Harvey Poppel. There were 216 mergers and acquisitions in this area last year, up 53% from 141 such transactions recorded the year before.

Siemens AG's \$844 million acquisition of IBM's Rolm Systems Division, Prime Computer, Inc.'s \$467 million acquisition of Computervision Corp. and AT&T's \$250 million acquisition of Paradyne Corp. were among the largest transactions in this area.

In 1988, mergers and acquisitions

increased by 57% in the telecommunications services category compared with 1987, Poppel said. The number of transactions jumped from 46 in 1987 to 73 last year. Among the largest transactions in this category were Centel Corp.'s \$775 million acquisition of United Telespectrum and United Telecommunications, Inc.'s \$600 million purchase of an additional 30.1% interest in US Sprint Communications Co.

The greatest number of transactions occurred in the information services sector, which saw 434 mergers and acquisitions last year, compared with 358 in 1987.

However, the \$4 million median value for a deal in this sector was lower than that for agreements in other areas. The median deal size was \$25 million in the telecommunications services group and \$15 million in the hardware and related services category, according to Broadview Associates.

In 1989, large firms such as AT&T and IBM will become more active buyers, Poppel predicted. Much of their activity will involve buying minority stakes of information technology companies and forming joint ventures with such firms, he added. ■

Europe 1992: Challenges to U.S. vendors



- Overcoming existing national brand loyalties
- Establishing a customer service organization capable of meeting local and pan-European client needs
- Establishing a sales organization that can meet specific country and multinational client needs
- Learning how to market and advertise to pan-European companies and country-specific areas

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

U.S. firms prep for post-1992 Europe

Vendors of network equipment and services position themselves for changing marketplace.

By Bob Brown
Senior Writer

U.S. suppliers of network equipment and services are gearing up to compete in the post-1992 open European market.

Vendors in the U.S. that already market their products and services in Europe are taking such steps as expanding their European operations and solidifying relationships with European post, telegraph and telephone administrations. American networking companies with little or no presence in Europe are seeking partnerships with European vendors and U.S. firms that have already established a foothold on the continent.

U.S. vendors will face a number of challenges, including the threat of protectionism, in the open European market. But there is sufficient time for them to figure out a way to clear those hurdles, analysts said.

However, said Seth Blumenthal, president of MCI International, Inc., "If U.S. vendors don't have a strategy for selling in Europe by 1992, it will be too late."

One for all

According to a recent report on the open European market by International Data Corp. (IDC) of Framingham, Mass., "Any company underestimating the power of the [European Economic Community], or dismissing it for any reason, is overlooking the single most significant transition in European business since World War II."

The 12 EEC member nations have agreed to remove physical, technical and fiscal barriers to the free movement of goods, services, workers and capital between participating nations by

Dec. 31, 1992. Many barriers will fall before then, however.

Some U.S. vendors, such as Timeplex, Inc. of Woodcliff Lake, N.J., already have a strong presence in Europe but are still busily preparing for 1992.

Timeplex has subsidiaries or distributors in all 12 EEC member nations, said John Poncelet, the company's director of international marketing. Timeplex is trying to improve its relationships with Europe's PTTs, which it sells products to and through, he said.

Poncelet, whose company

INDUSTRY BRIEFS

3Com Corp. last week reported record sales and net income for its third fiscal quarter, which ended Feb. 28.

The Santa Clara, Calif.-based local network vendor reported net income of \$10.7 million for the third quarter, up 62% from \$6.6 million for the third quarter of 1987. Sales rose to \$107.1 million, up 62% from \$66.2 million for last year's third quarter.

Compared with the corresponding quarter a year ago, international sales more than doubled, representing 41% of total company sales.

Business was particularly strong in Europe and Canada, the company said.

GTE Corp.'s GTE Southwest, Inc. unit last week said it will fire 600 of its 8,200 employees in Texas as a result of a recent Texas Public Utility Commission (PUC) ruling requiring the company to cut its rates. GTE Southwest also said it will release more than 100 contractors and defer filling about 400 existing job vacancies.

The state PUC ordered GTE Southwest to cut its rates to reduce annual revenue by about \$59 million. The commission also ordered the company to refund \$128 million to customers for what it termed overcharges in previous years.

Unisys Corp. last week said it expects to report a loss of between \$60 million and \$80 million for the first quarter ending March 31. The company termed the expected loss "an aberration" and said it anticipates its operating results to return to more normal profit levels in the second quarter. ■

People & Positions

Microsoft Corp. of Redmond, Wash., last week announced three executive changes as part of the reorganization of its Systems Software division. The reorganization involves the consolidation of Microsoft's advanced OS/2 operating systems development and marketing activities into one group.

As a result of the reshuffling, **Paul Maritz** was named vice-president of advanced operating systems and will report directly to Steve Ballmer, vice-president of Systems Software at Microsoft. Maritz was general manager of the company's networking and Unix business unit.

Peter Neupert was hired as senior general manager of OS/2 business, reporting to Maritz. Neupert, who was vice-president of operations at Graphic Software Systems in Beaverton, Ore., will be responsible for OS/2 marketing and program management.

Adrian King was named general manager of the workgroup services group and will report to Ballmer. King, who was formerly general manager of marketing for OS/2, will direct all operations for value-added local network products, including SQL Server. ■

"If U.S. vendors don't have a strategy for selling in Europe by 1992, it will be too late."

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does 35% of its business in Europe, said, "1992 is not a so-called big bang — things are happening now. We believe that there is a major opportunity for our type of business."

Wide-area network companies such as Timeplex and Codex Corp. stand to fare well in the new Europe as users expand their networks across national and vendor boundaries, analysts said (see "Codex expects opportunities in new Europe," page 10). Vendors that can provide European users with network products supporting high-bandwidth communications will do well in the post-1992 market, they said.

MCI International, which already has relationships with all of

(continued on page 10)

U.S. firms prep for post-1992 Europe

continued from page 9

the major telecommunications authorities in Europe, is looking to provide European users with multinational networks and information services. Providing these services in Europe is extremely important, Blumenthal said, because MCI International anticipates up to a 20% growth rate in European sales in coming years, compared with what he said will be 8% to 10% growth in the U.S.

Blumenthal declined to detail specific steps being taken by the company, but he did say, "We're not asleep at the switch."

3Com Corp. is another vendor that already has a big presence in Europe but is nonetheless seeking to strengthen its position there. The local network vendor,

which has subsidiaries or distributors in all the European countries participating in the 1992 plan, last week reported that 41% of its \$107.1 million in third-quarter sales were made overseas and that three-quarters of those sales were made in Europe (see Industry Briefs, page 9).

To ensure a stronger presence in Europe as more companies set up pan-European networks, 3Com is working to coordinate all of its European sites so that it can provide users of multinational nets with consistent pricing and service across the continent, said John Marman, vice-president of 3Com's International Division.

Other vendors, such as The Info Group, a Framingham-based net management

software company, are just getting started overseas. The Info Group is working with other U.S. vendors, including some regional Bell holding companies, to establish a presence in Europe, said company President John Dretler. By working with U.S. vendors that already have a presence in Europe, The Info Group will save itself the expense of setting up shop, he said.

There are several basic options available to vendors trying to get a toehold in Europe for the post-1992 era, said Kevin McCarthy, a principal at PA Consulting Group, Inc. in Hightstown, N.J. Vendors can form joint ventures with European partners, establish licensing arrangements with European distributors and sales agents, or merge with or acquire a European company, McCarthy said. Some vendors will want to establish local manu-

facturing facilities as well, he added.

Susan Mirbach, director of marketing and major accounts at France Telecom, Inc., the New York-based subsidiary of France Telecom International, said a number of U.S. vendors have already teamed with her company's parent in Europe. The RBHCs have been among the most active, offering paging and videotex services in France, she said.

"American companies should not go into Europe thinking they are going to conquer the continent," Mirbach said. American firms have to realize "things are not done the same way in Europe. To succeed, American firms have to be flexible."

Overseas obstacles

Even the most savvy U.S. vendors will face formidable obstacles in their ef-

Codex expects opportunities in new Europe

In the Europe of the next decade, Codex Corp. believes it will face a number of challenges and opportunities.

According to Ray Wright, director of international strategic planning for the Canton, Mass.-based manufacturer of network equipment, Codex currently does one-third of its business overseas. Codex expects 1992 to bring increased European demand for network products and services due to a general economic expansion that will result from the withdrawal of trade barriers.

Meeting that demand should be easier, Wright said, once standardized product approval procedures are adopted and international product distribution channels are simplified.

"As trade barriers come down," Wright said, "many of our customers will be able to expand their businesses in Europe. When this happens, we'll be ready to support their networks. 1992 should boost demand for our kinds of products and services."

Codex, which manufactures network management systems, T-1 and other multiplexers, gateways and modems, believes it's well-positioned to compete in the Europe of 1992. Although the company's manufacturing is done in the U.S. and Canada, Codex maintains marketing and customer support offices in France, Germany, Sweden, Belgium and the UK. It has distributors located in Holland and Italy.

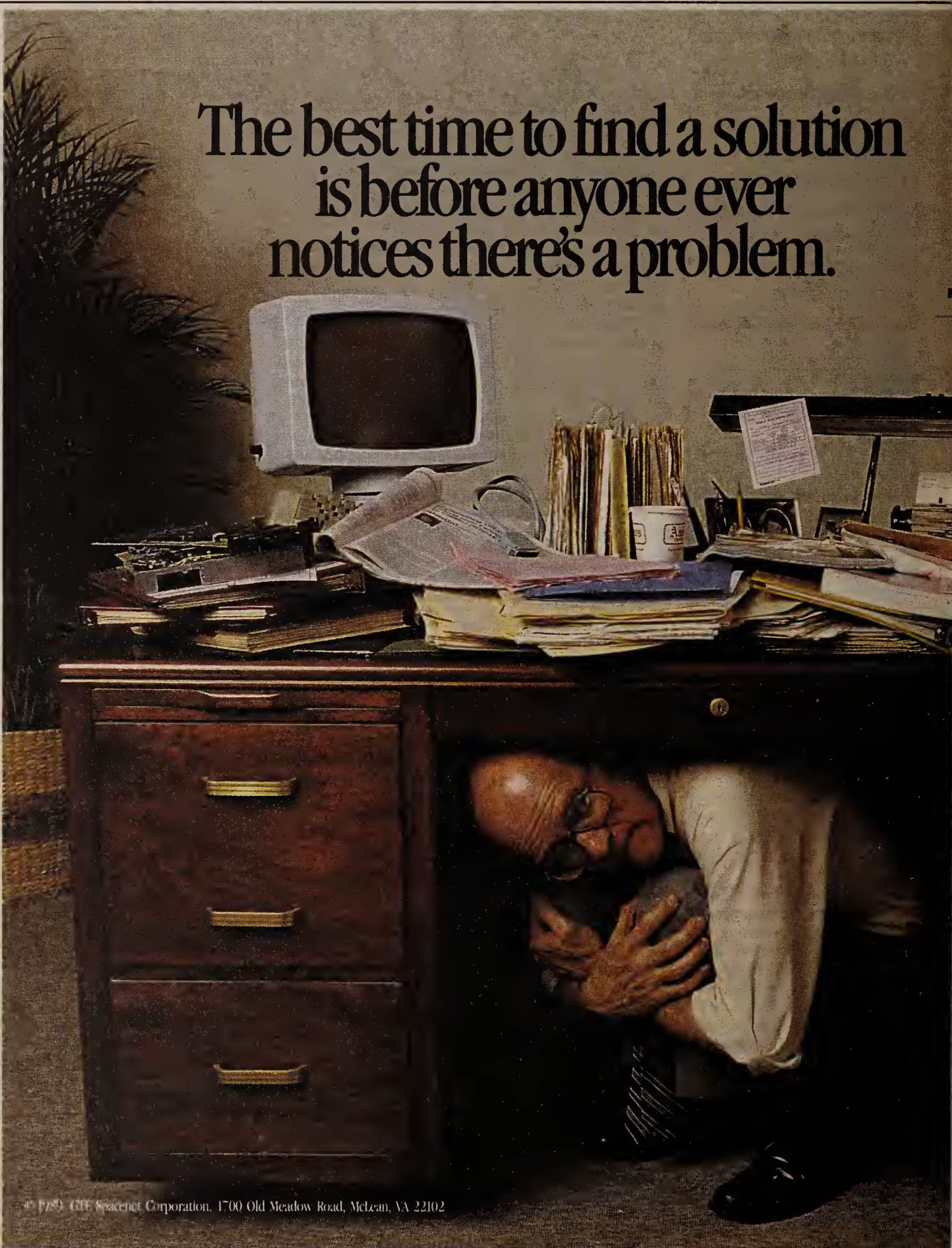
Local European offices, Codex believes, are critical to selling products and services overseas. "While the trade barriers will go down in 1992, cultural barriers will not," Wright said.

As European countries move toward creating a single economic market, Wright expects Codex also to benefit from more standardized product inspection and shipping procedures than those that currently exist between most European countries.

"Today, we have to have each product that connects to public nets approved in each country because the requirements are different. Hopefully, in 1992, we can have equipment approved by one organization," Wright said.

(continued on page 46)

The best time to find a solution
is before anyone ever
notices there's a problem.



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forts to expand into Europe, including overcoming strong brand loyalty, according to the IDC report (see graphic, page 9).

Some U.S. vendors also are concerned that Europe's new openness could, in fact, lead to an economic fence being built around the continent, Timeplex's Poncelet said. Europeans could decide to promote European powers in various communications equipment and service industries, he said. But protectionism will not surface right away because European companies are lagging behind U.S. firms in many markets, he added.

"Our competitors [in Europe] are mostly from the U.S. as well, so whoever has a major presence will be doing very well for a while," he said. "The European companies don't have their act together to serve their own market as well as we do now." ■

Analysts say Excelan acquisition gives Novell a competitive edge

By Gail Runnoe
Washington Correspondent

PROVO, Utah — Novell, Inc.'s planned acquisition of Excelan, Inc. will enable Novell to bring its Portable NetWare operating system to market sooner. Analysts say this will give the company a boost in its battle against vendors of NetWare rival LAN Manager.

According to George Kelly, vice-president at Morgan Stanley & Co., Inc., an investment firm in New York, the acquisition will give Novell control over development of Excelan products based on Transmis-

sion Control Protocol/Internet Protocol, Sun Microsystems, Inc.'s Network File System, Apple Computer, Inc.'s AppleTalk and Open Systems Interconnection protocols.

Novell needs to broaden its capabilities in these networking areas, Kelly said, and Excelan's expertise can help Novell get Portable NetWare products to the market.

Portable NetWare will run on a variety of systems, including Unix-based processors. More than 20 companies, including Hewlett-Packard Co., NCR Corp., Northern Telecom, Inc., Prime Computer, Inc. and

Unisys Corp. had agreed to market Portable NetWare on their Unix-based systems or were negotiating to offer it when the product was introduced last month ("Portable NetWare debuts with backing," *NW*, March 6).

"Having the Portable NetWare products ready sooner," Kelly said, "will certainly improve Novell's competitive position."

Richard Kimball, limited partner at Montgomery Securities in San Francisco, said the Excelan purchase is "something Novell needed to do" to enable NetWare to compete with versions of Microsoft Corp.'s LAN Manager network operating system. "One of the threats OS/2 LAN Manager [poses for NetWare] is its ability to handle different network protocols," he said.

The Excelan acquisition will help Novell beef up its multivendor communications capabilities, Kimball said.

Frederick Ziegel, senior vice-president at Needham & Co., a New York investment firm, agreed that NetWare systems need greater interoperability. "The market is headed toward enterprisewide, heterogeneous networks," he said.

Ziegel said he believes that by incorporating Excelan's wide protocol support into NetWare products, "users will be able to use NetWare to transparently communicate across [multivendor] environments."

"It would have been a strategic error for Novell not to buy Excelan," said Peter



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“The market is headed toward enterprisewide, heterogeneous networks,” Ziegel said.

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Cole, analyst at the San Francisco-based brokerage firm Bullock, Costigan and Welpton. "All [network] companies today are trying to migrate from local network players to enterprise connectivity players."

Users want multivendor connectivity, Cole said, and by acquiring the protocol expertise of Excelan, Novell will be better able to meet user demand.

Some observers, however, said Novell's plan to purchase Excelan represents a dramatic change of direction for the local network vendor, based here. Novell took a \$10.2 million write-down last year as part of a move to get out of the hardware business and focus on expanding software sales.

Some analysts said they believe the Excelan purchase puts Novell back in the hardware business.

But Morgan Stanley's Kelly believes this is an exaggeration. "A great deal of what Excelan ships is 'firmware,'" he said. "It's hardware and software bundled."

David Ferris, president of Ferris Networks, a San Francisco-based personal computer dealer, said Novell's purchase of Excelan "will help Novell tremendously" by giving the company some much-needed credibility in the area of standards adoption. "Novell is often criticized for being proprietary in nature," he said. Acquiring a protocol specialist such as Excelan "will help give Novell credibility that it will adopt [communications] standards."

"Novell's most significant challenge," Ferris said, "will be to integrate the skills of the two companies." ■

DAVID ExpressNet. What we left out



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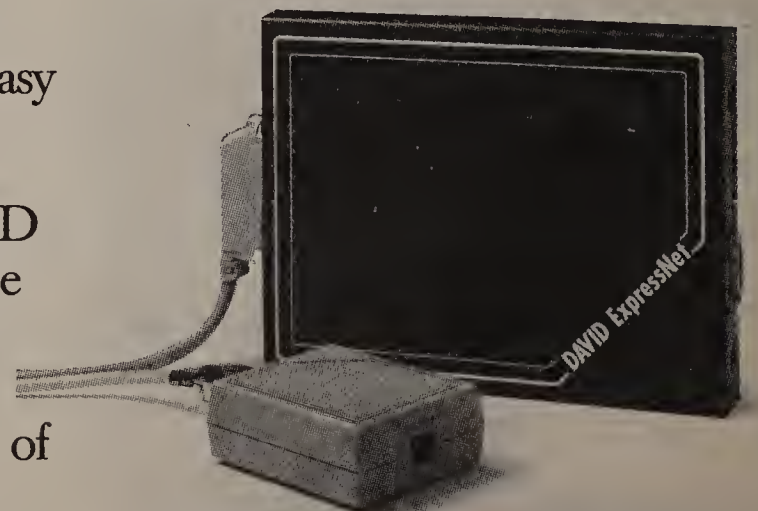
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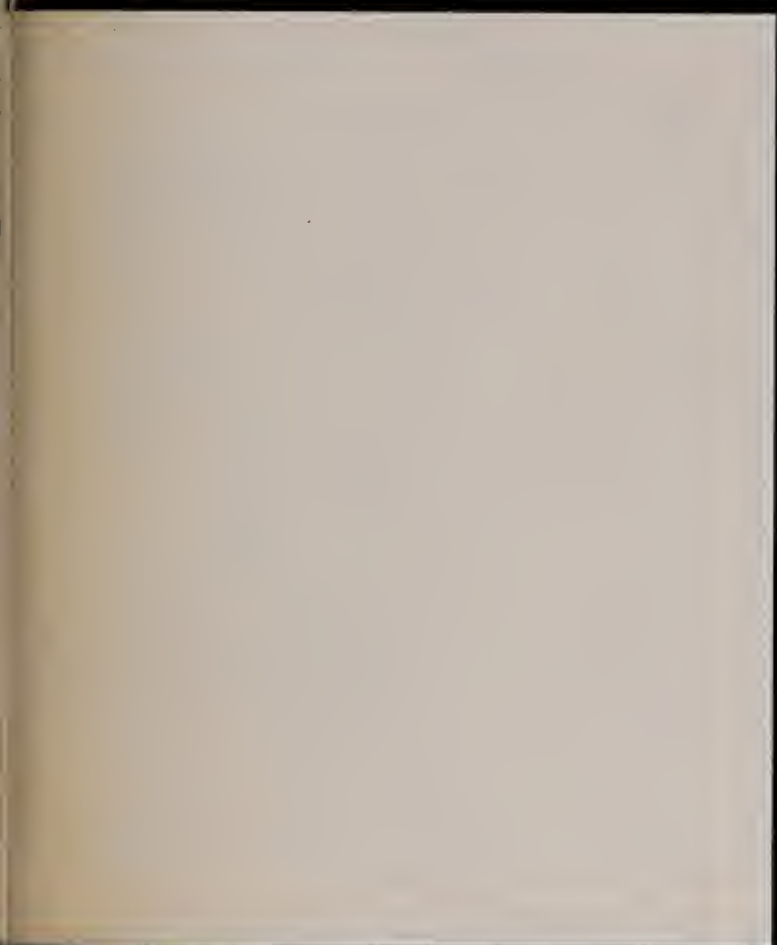
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TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

By the end of last year, 73% of United Telecommunications, Inc.'s access lines were served by digital technology, compared with 62% in 1987 and 48% in 1986, according to the firm's 1988 annual report. The company, which has local telephone companies in 19 states, expects that number to increase to 80% in 1989 and 85% in 1990.

Carrier Watch

AT&T recently transmitted an Integrated Services Digital Network phone call over a satellite link in a demonstration conducted at its Digital Services Laboratory in Holmdel, N.J.

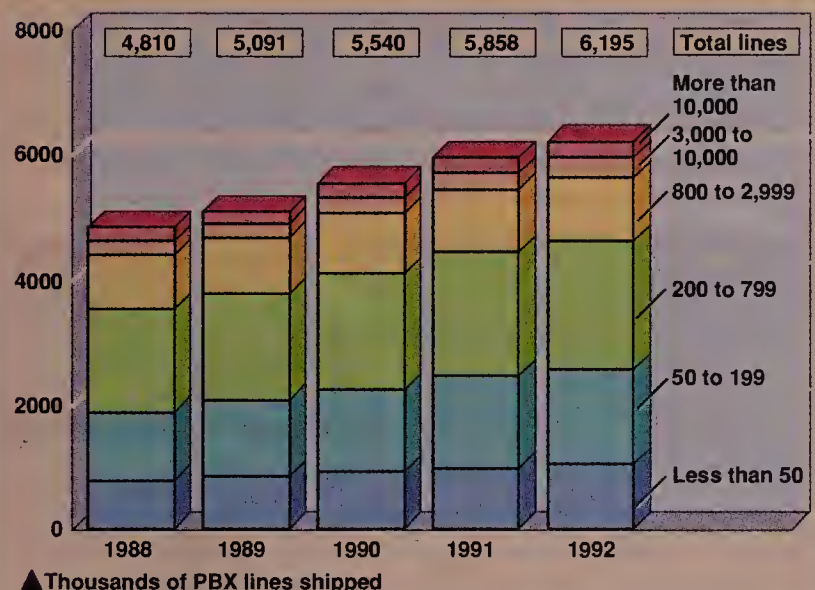
The phone call consisted of a simultaneous voice conversation and video image that was transmitted to an AT&T 5ESS switch using the ISDN Basic Rate Interface. From the 5ESS switch in the Holmdel lab, the signal traveled to an earth station in Roaring Creek, Pa., where it was transmitted to an International Telecommunications Satellite Organization satellite and back again.

Pacific Bell recently announced that **MCI Communications Corp.** has become the seventh long-haul company to sign up for its Exchange Universal WATS service.

The service enables Pacific Bell customers to support local and long-distance WATS calls over the same access line. Without the service, users would need two separate lines, one for WATS calls to locations outside of California and another for Pacific Bell WATS calls.

Other long-distance companies participating in Exchange Universal WATS include Allnet Communications
(continued on page 14)

PBX line shipments expected to rise slowly



GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

N.J. utility picks Harris to build microwave, fiber net

New network to offer central mgmt. capabilities.

By Bob Wallace
Senior Editor

MORRISTOWN, N.J. — Jersey Central Power & Light Co. (JCP&L) recently awarded Harris Corp.'s Farinon Division a \$1.1 million contract to construct an 89-route-mile digital microwave and fiber-optic cable network.

The private network, slated for cutover in June, will carry voice traffic statewide and enable the utility to monitor and manage its electricity distribution net from its headquarters here.

The network will replace large

“**O**ur analog microwave network was totally tapped out,” said JCP&L's Wright.

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portions of JCP&L's current 20-year-old analog microwave network but will use existing microwave towers and permits to operate in certain radio frequency bands.

“Our analog microwave network was totally tapped out,” said David Wright, project manager for JCP&L. “We needed more bandwidth to handle increases in voice and data traffic.”

The new microwave network will extend south from Mount Freedom to Berkeley Heights, Freneau, Allenhurst, Larrabee and Oyster Creek, N.J. Fiber-optic cable will link JCP&L's Oyster Creek nuclear power plant to the microwave network.

Harris Farinon will install its DVM7-45 and DVM10-8T microwave radios, which operate in the 6-GHz radio frequency band, as well as its DVL-44 fiber-optic cable system along the old network routes. New and old segments of the microwave network will be equipped with Harris Farinon Digital Versatility Alarm Units — remote terminal units that are used to control electricity distribution.

Net management a factor

JCP&L will use Harris Farinon's Farscan Network Management System software on an Intel Corp. 80386-based IBM Personal Computer equipped with 2M bytes of expanded memory and a 40M-byte hard drive to monitor network performance and alarms.

The Farscan system continuously polls remote terminal units for control and alarm information, which is transmitted over the microwave net to JCP&L's facility here, where it is analyzed by a single network operator.

Wright said the Farscan system figured prominently in JCP&L's decision to award the networking project to Harris Farinon.

“Their net management system was much better than those offered by the rest,” Wright said.

Harris Farinon beat out NEC Corp., Rockwell Telecommunications, Inc. and Avantek Corp. for the lucrative networking project, according to a Harris Farinon spokesman.

JCP&L provides electricity to 2.1 million residents — almost half the state's population — in coastal and northwest New Jersey. □

Health insurance co. banks on voice units

Blue Cross & Blue Shield voice-response devices designed to free up workers, save on 800 calls.

By Wayne Eckerson
Staff Writer

COLUMBIA, S.C. — Blue Cross & Blue Shield (BC/BS) of South Carolina is fine-tuning two new voice-response systems designed to free workers from routine phone inquiries, reduce telephone charges on incoming 800 calls and improve customer service.

The voice-response systems, developed by Input Output Computer Services, Inc. (IOCS) of Waltham, Mass., enable customers to access a BC/BS data base and retrieve information by using their push-button phones to respond to voice prompts.

While the new systems have been hampered by minor problems since they were installed a few months ago, BC/BS officials are confident that they will significantly improve operations.

“The systems will revolutionize our customer service and expedite claims verification,” said Steve Wiggins, vice-president of information systems at the health insurance firm.

The IOCS systems consist of two Digital Equipment Corp. MicroVAX II computers linked via RS-232 to three Votrax International, Inc. voice-response systems. The voice-response devices support 87 lines and automatically answer incoming calls with a standard script that instructs callers how to access options by using their telephone keypad.

One of the voice-response systems is used to support about 2,000 pharmacists in South Carolina. The pharmacists can call in to check the eligibility and coverage limits of BC/BS subscribers before filling a prescription.

Pharmacists dial into BC/BS' voice-response system and punch in a subscriber's membership number using their push-button phone. A voice recording tells the pharmacist whether the subscriber is eligible to receive benefits and how much of the prescription's cost will be covered.

The other system allows doctors and BC/BS subscribers to Civilian Health and Medical
(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

An AT&T/US Sprint oligopoly? MCI Communications Corp. last week urged the U.S. General Services Administration not to require government agencies to purchase all their communications services under the Federal Telecommunications System (FTS) 2000 contract. The carrier said such a requirement would effectively prevent competition from any non-FTS 2000 vendors and would result in higher prices for taxpayers.

In a letter sent to the GSA, Jerry Edgerton, MCI's vice-president of government systems, said expanded regulations under consideration by the agency would go too far in tightening provisions that mandate use of FTS 2000.

Edgerton said that the intent of Congress and initial FTS 2000 regulations concerning mandatory use applied only to switched voice services but that the GSA is trying to extend those regulations to cover data and video services as well.

Currently, federal agencies can obtain a waiver to purchase nonswitched voice services outside of FTS 2000 if their requirements cannot be met by the government net, MCI said.

In addition, Edgerton said the GSA is attempting to expand FTS 2000 far beyond its original scope by suspending or canceling government communications procurements that were under way before FTS 2000 was awarded. The GSA is also adding new services not originally specified in the competitive bid for FTS 2000, the letter claimed.

MCI was a subcontractor on an FTS 2000 bidding team headed by Martin Marietta Corp. The contract, which could be worth up to \$25 billion over 10 years, was awarded to AT&T and US Sprint in December. Earlier this year, MCI filed a protest against AT&T's portion of the contract award and, when the GSA rejected it, appealed, taking the matter to court. □

Insurer banks on voice units

continued from page 13

Programs of the Uniformed Services (CHAMPUS) to check the status of health insurance claims using their push-button phones. CHAMPUS provides BC/BS coverage for the family members of U.S. military personnel.

More than 50% of CHAMPUS beneficiaries in the U.S. are covered by BC/BS of South Carolina.

With both systems, the MicroVAXes tell the voice-response systems what words to string together when providing account-specific information to callers. Words and stock phrases recorded in speech form are either stored on disk or burned into erasable, programmable read-only memory chips housed in the

voice systems.

According to Wiggins, the voice-response systems can process almost twice as many calls as a human operator. By shortening customer calls, the systems will reduce BC/BS' telephone charges on its 800 service and improve customer service by providing information to customers more quickly.

BC/BS also will be able to reduce the number of customer ser-

vice representatives handling inquiries once the systems are running smoothly. Some representatives, however, will still be needed to service customers with complicated claims and to handle other matters, Wiggins said.

Start-up bugs

Wiggins said the systems, which handle about 6,000 calls daily, have failed on a few occasions. "We are not quite sure

whether the problem lies in the software, the switch, the telephone lines or someplace else, but we and IOCS are working hard to correct it," he said.

IOCS has implemented similar voice-response systems for several major banks, including The Chase Manhattan Bank, N.A. and Bank of Boston Corp., according to Kate Parker, marketing services specialist at IOCS. Wiggins said IOCS has a good track record, and he is confident that the few remaining problems will soon be resolved.

Meanwhile, IOCS and BC/BS

Wiggins said the systems can process twice as many calls as a human operator.

▲▲▲

are investigating the possibility of incorporating point-of-sale devices into the prescription-coverage verification system, Parker said.

The system would enable pharmacists to run customers' BC/BS cards through a POS card reader, transmitting customer information to the voice-response system in BC/BS' data center here. The system would recognize the inquiry as a data-only inquiry and respond with data instead of a voice message. This data would then appear on the LCD screen of the POS device. **Z**

Carrier Watch

continued from page 13

Services, Inc.; Express Telecommunications, Inc.; TelaMarketing Corp. of San Diego; Escondido Telephone, Execulines, Inc. of Sacramento, Calif.; and Call America. Exchange Universal WATS reduces the number of lines that users need to support, a Pacific Bell spokesman said.

DFW MetroLink, Inc. recently announced plans to build an all-fiber network in the Dallas-Fort Worth metropolitan area to provide voice and data communications services to businesses and public institutions. The network could be cut over by midyear, according to a DFW MetroLink spokesman. The company has agreed to pay TU Electric Co. about \$42 million over the next five years to build the 140-mile fiber backbone network, the spokesman said. The fiber cable will be strung along TU Electric's utility pole rights-of-way.

Under a licensing agreement signed by the two companies, TU Electric will use four fiber lines in each cable for its internal communications and DFW will have exclusive rights to the rest of the fiber. **Z**

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DATA COMMUNICATIONS

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Worth Noting

“Corporations are piling up an enormous hodgepodge of data in a variety of different systems that can't talk to one another. It's turning into a grandmother's attic of information on a scale never before imagined.”

Robert Allen
Chairman and
chief executive officer
AT&T

Data Packets

Hughes Network Systems, Inc. recently announced upgrades to its low-end and mid-range packet switches.

The 9708 Micro Packet Exchange (MPX), the company's low-end switch, now operates at speeds up to 64K bit/sec. Previously, the top speed of the 9708 MPX was 19.2K bit/sec.

The 9708 MPX is an eight-port switch that supports any combination of X.25 access lines and trunks, according to a Hughes spokeswoman.

Some competing switches restrict the mix of access and trunk connections, she said.

The 9708 costs \$6,900 and is available now.

The 9724 Remote Packet Exchange, the company's mid-range switch, is now available with a new option.

The Mini Auxiliary Service Processor (MASP) option lets the switch assume a variety of network management functions and support network services from a centralized net control processor, according to the spokeswoman.

The MASP is available now. Prices for the 9724 with the MASP option range from \$26,000 to \$34,000.

Hughes declined to price the option separately.

For more information, contact Hughes at 11717 Exploration Lane, Germantown, Md. 20874, or call (301) 428-7113. □

Five steps to ensure network service

As networks grow in complexity, users are demanding more maintenance and service support from their equipment and service vendors. In order to ensure a suitable level of service, users can plot various strategies.

- Sign service contracts with vendor performance guarantees, including penalties for poor service.
- Subcontract service and support to third-party maintenance vendors.
- Assign vendor technicians to users' sites.
- Tailor vendor services to users' network maintenance needs.
- Rely on in-house support staff for rapid maintenance response.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

Users apply pressure, win tailored support contracts

Study says firms hammer out innovative plans.

By John Cox
Senior Editor

FRAMINGHAM, Mass. — Juggling the need for speedy repairs with the need to minimize service fees, users are signing innovative network support contracts with their equipment vendors, according to a recent study.

The study, conducted by International Data Corp. (IDC), a market research firm located here, found that users with multi-vendor networks are experimenting with various strategies to ensure they get the most appropriate support and maintenance services.

Users are more willing than ever to demand tailored service and innovative billing.

▲ ▲ ▲

Users are more willing than ever to demand concessions, tailored service programs and innovative billing arrangements from their suppliers, according to Doug McLeod, an IDC senior analyst and author of the study.

McLeod interviewed 18 communications managers at various-sized companies in financial services, manufacturing and government/nonprofit sectors. All had at least 500 full-time users in a net comprising at least one mainframe, three minicomputers and two local-area nets. The larger companies each operated a network with dozens of IBM mainframes and an alphabet soup of other vendors' equipment, accessed by 5,000 to 30,000 microcomputers worldwide.

The IDC study found that many interviewees had devoted a lot of time and energy to negoti-

ating one of two types of service contracts. One requires the vendor to meet service performance measures or pay a penalty, usually in the form of a discount on the monthly maintenance fee.

Performance guarantees, such as a one- or two-hour response time to a network problem, have become so critical to some customers that they often will not even talk with equipment vendors that are unwilling to write guarantees into the purchase contract, McLeod said.

The second approach is a shared service contract, in which the customer and vendor agree to split various maintenance and support tasks. Typically, the customer's in-house service staff does preliminary troubleshooting on a network problem. The in-house staff handles minor problems. But it identifies and diagnoses major problems, turning them over to the vendor's support experts.

This approach means that customers can either reduce their existing support staff or sidestep the need to increase it as the net grows in size and complexity. At the same time, it makes the most of the vendor's network experts by giving them preliminary information on where and what the problem is. The result is lower in-house staff costs and fast response, according to McLeod.

Negotiations needed

In both such contracts, customers repeatedly emphasized the importance of long, detailed negotiations to clarify customer needs and expectations and to lay out vendor responsibilities.

Another option, especially for networks that are vital to the customer's business, is well-known in big customer sites: The vendor assigns maintenance staff to the site for on-the-spot support.

What's new, according to McLeod, is the use of innovative

(continued on page 16)

Router helps firm distribute processing

United Stationers deploys LAN/WAN interface to make use of microcomputer processing power.

By Paul Desmond
Staff Writer

CHICAGO — United Stationers Supply Co. is taking advantage of a new breed of local-to-wide-area network interface — the so-called brouter — to help it off-load mainframe processing to personal computer local networks.

Brouters combine the capabilities of bridges and routers to let users transmit data from disparate local networks over a wide-area backbone, according to Timothy Zerbiec, a principal with the Dedham, Mass.-based consultancy Vertical Systems Group.

Brouters can function as bridges linking two local nets, which do not necessarily use the same transport protocol, or as routers, which can connect one local net with many others, as long as they use the same transport protocol.

Several vendors, including Infotron Systems Corp. and Vitalink Communications Corp., have announced brouters but are not shipping them yet. CrossComm Corp., Halley Systems, Inc., Retix and 3Com Corp. are shipping brouters (see “3Com offers soft-

ware, two brouters,” page 23).

United Stationers, based here, is an early user of CrossComm's ILAN-1 brouter. Bernie Schneider, director of telecommunications for the company, said the product is helping the company move toward a distributed processing environment based on IBM Token-Ring Networks.

United Stationers is replacing 3270-type terminals in its distribution centers with personal computers and IBM Personal System/2s on Token-Ring Networks, Schneider said. The Token-Rings are linked by ILAN-1s to StrataCom, Inc. Integrated Packet Exchange T-1 multiplexers.

The Token-Ring traffic is then carried over the company's national T-1 backbone to other local nets, he said.

Goodbye 3090s

The company is gradually moving warehouse inventory applications off its IBM 3090 mainframes and onto the local networks in an effort to take advantage of the processing power of the microcomputers and to provide redundancy, Schneider

(continued on page 16)

CBOT building after-hours net for futures trading

By Barton Crockett
Senior Editor

CHICAGO — The Chicago Board of Trade (CBOT) said recently it is building a trading network that will let exchange members around the world buy and sell futures by computer after regular trading hours.

CBOT is counting on its Aurora network to appeal to global traders who buy and sell futures based on developments in foreign markets. Aurora will compete against the Global Exchange (GLOBEX), a trading network the Chicago Mercantile Exchange plans to offer this fall.

Aurora will consist of Apple Computer, Inc. Macintosh IIs in trader offices that will be linked via leased lines to a T-1 backbone net providing access to CBOT's data center here. The trading workstations will support a video game-like interface meant to mimic activity in a trading pit.

“We think traders will be more comfortable with Aurora because

what they will see on their screen will be very much like what happens in an actual trading pit,” said Glen Belden, vice-president of automation at CBOT.

CBOT plans to finish building an Aurora prototype by September. CBOT will offer the system to users sometime after the prototype debuts, but Belden declined to say when.

To use Aurora, traders will lease a Macintosh II from CBOT. Each Macintosh II will be bundled with artificial intelligence software from Texas Instruments, Inc. that helps manage the user interface. The Macintosh IIs will send trading data via dedicated 9.6K bit/sec lines to a T-1 backbone net, which will then carry it to and from Tandem Computers, Inc. processors in the data center.

Every trader submitting a competitive bid for futures on the Aurora network is identified on the workstation screen by an icon denoting his bid. These icons are

(continued on page 16)

Brouter helps firm distribute

continued from page 15

said. So far, four distribution centers, two here and one each in Atlanta and St. Louis, have been outfitted with the Token-Ring Networks and ILAN-1 links, Schneider said. The office products wholesaler plans to install Token-Rings in all 13 of its major distribution centers, he said, and

expects to have 3,000 local net nodes by 1992.

The Token-Rings handle such warehouse applications as receiving and inventory within each location.

Thanks to the CrossComm ILAN-1 product, any Token-Ring network can access any other across the T-1 backbone, Schneider said.

"With the bridging, the LAN begins to look like one large vir-

tual network," he said. In addition, the configuration has cut response time to about 1.2 seconds when communicating with the host, as compared to 1.5 seconds with 3270-type terminals, Schneider said.

ILANs of automation

Each ILAN-1, a stand-alone hardware and software unit based on an Intel Corp. 80286 microprocessor, can support as many

as eight links to remote networks. In addition, the device acts as a local bridge between Token-Ring local nets within the same building, according to Schneider.

Both are important features for United Stationers, since the company is committed to providing redundancy in its network, Schneider said. Toward that end, the company installs at least two Token-Rings in each of its distri-

bution centers, complete with separate file servers, and uses a CrossComm ILAN-1 to link them.

Schneider said United Stationers decided on the brouter because it is a "learning bridge," meaning no user configuration is required. When the device is brought on the network, it quickly determines which network addresses are local and which should be routed to remote networks, he said. ■

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amdahl
Communications

Users win tailored support

continued from page 15

billing arrangements. In the past, users paid a flat monthly fee for an on-site technician, or on-site support was bundled with the yearly maintenance contract. Now, some customers are paying only for the repair work actually performed by the technician.

One example was a customer whose service vendor agreed to supply an on-site technician 40 hours per week and bill the client only for the time actually spent repairing and servicing.

McLeod said he expects vendors to develop new variations on this idea. One might be to promise fast response time to problems by an on-site technician who, in the meantime, carries out a program of preventive maintenance at a low monthly rate.

"In the past, the guy hangs around and goes out to fix a problem," he said. "But if you can have him doing preventive maintenance . . . [and] have him right there in case something goes wrong, you're building a synergy that benefits not only the vendor but also the customer."

Copies of the study can be obtained from IDC, 5 Speen St., Framingham, Mass. 01701; or call (508) 872-8200. ■

CBOT building after-hours net

continued from page 15

pooled in an on-screen mock trading pit.

To execute a trade, a trader will move his icon to a green priority box in the upper left-hand corner of the screen. Other traders will buy or sell futures while the trader's icon is in the priority box.

GLOBEX, by contrast, features a traditional user interface with which traders remain anonymous and are unable to choose a partner. "Traders get a great deal of information by knowing who they deal with," Belden said.

However, this icon-based trading system may be Aurora's biggest drawback, according to Paul Tattersall, vice-president in charge of GLOBEX at Reuters Information Services, Inc. "When you get an active environment with 100 or 200 icons on [an] Aurora [screen], it's going to be very difficult to see what's going on," Tattersall said. ■

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

“Novell has sold over 200 copies of NetWare for VMS since it began shipping four months ago. Large users like Chrysler Corp., Kellogg [Co.] and Irving Trust Co. are using it in networks of over 20 nodes.”

Mark Calkins
Vice-president
of marketing
Novell, Inc.
Software Group
Provo, Utah

Netnotes

IBM is rewriting its Application System/400 (AS/400) minicomputer file-transfer and file-access software to increase the machine's data-transfer and disk-access speeds, which currently lag behind that of less powerful Intel Corp. 80386-based servers.

The AS/400 is more powerful than IBM's Personal System/2 80386-based systems. However, the 80386 server models access and process data at a much faster rate than AS/400s, said Janet Krueger, an IBM senior programmer for AS/400 products.

“We have to rewrite and optimize the AS/400 file-access software to increase the data-transfer speed,” Krueger said. “We're also working to improve the [memory] caching functions to give users faster response time. We acknowledge we have performance limitations with the AS/400, and we are working to correct them.”

The AS/400 server performance on PC-DOS-based nets running IBM's PC Support Program application software is currently equivalent to a low-end Personal Computer XT or AT workstation, Krueger said.

Once the performance problems are corrected, it will pave the way for IBM to position the AS/400 to provide users with distributed applications running under Systems Application Architecture. ■

FDDI prices force users to backbones

Users save by bridging LANs to backbones, rather than using the technology in local nets.

By Susan Breidenbach
West Coast Bureau Chief

SAN FRANCISCO — The high cost of Fiber Distributed Data Interface (FDDI) products is driving users to build FDDI backbones linking local networks instead of adopting the technology at the departmental level.

At \$15,000 to \$30,000 per typical FDDI network interface, few users can afford to install the technology throughout their organization. Instead, users are bridging local nets to FDDI backbones.

“I have a hard time justifying spending more than 10% of the purchase price of a system on its communications controller,” said one network specialist who requested anonymity. He said his company, a Fortune 500 firm, will “be using FDDI primarily as a backbone technology for some time to come.”

Hal Spurney, director of marketing for Fibronics International, Inc., a network vendor in Hyannis, Mass., said many users would prefer to use FDDI in a local net instead of as a backbone.

“We are seeing a lot of customers who want a direct connection for workstations and host computers,” Spurney said.

However, what users want and what they buy are two different things, Spurney said. Consequently, his company has concentrated on FDDI backbones for Ethernet local networks. “That's where most of the current demand is,” he said.

The cost barrier

The connection costs for FDDI are expected to drop eventually. In fact, Simple-Net Systems, Inc. of Brea, Calif., last month rolled out the first FDDI controller for IBM AT-compatible personal computers.

The device, priced at \$4,995, costs much less than other workstation interface cards, but it is still far more expensive than the average price of Ethernet and token-ring adapter boards, which typically cost \$500 to \$800 each.

Besides the cost barrier, some users are reluctant to embrace FDDI until the standard is com-

(continued on page 18)

Lotus prepares to market LAN version of Lotus 1-2-3

By Laura DiDio
Senior Editor

CAMBRIDGE, Mass. — Lotus Development Corp. last week announced it is developing local network versions of its Lotus 1-2-3 spreadsheet for both DOS- and OS/2-based systems.

Lotus said it plans to market server-based versions of its 1-2-3 Release 2.2 and Release 3, both of which are due out later this year. Customers receive one software license that centralizes the application on a server, making it available to the different local network nodes supported by the user's local network operating system. Users also must purchase node licenses for every personal computer or workstation attached to the server.

The networked 1-2-3 versions will contain all of the application features and functionality of stand-alone versions, plus network management capabilities, according to Rob Perry, the company's manager of 1-2-3 product programs.

“All of the software resides on

the server and not on the user's individual PC,” Perry said. “This gives us the advantage of supporting users on diskless workstations.”

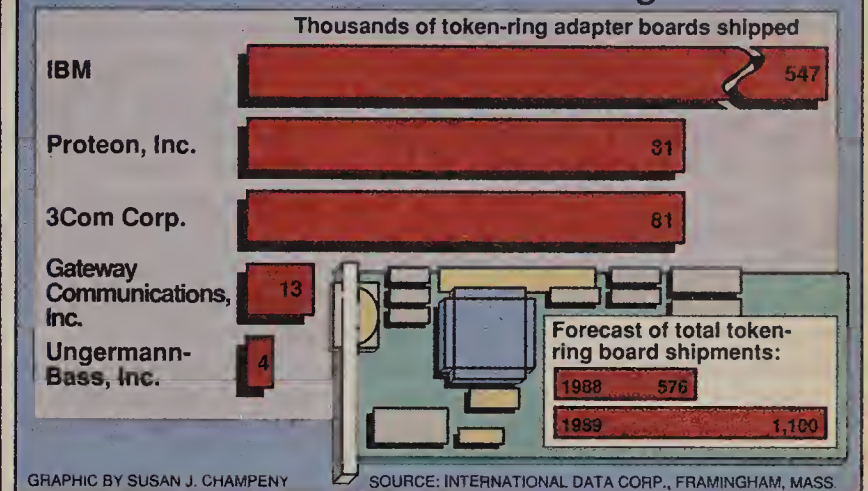
The network server versions of both 1-2-3 Release 2.2 and Release 3 support a file-locking feature that contains automatic and manual reservation facilities. In automatic mode, the first user to retrieve a file obtains write access, whereas in manual mode, users have to request a reservation. Users without a reservation receive only read access to a file.

“Spreadsheets were originally developed with one user in mind; people didn't have to worry about other users making changes to a file,” Perry said. “Now, with spreadsheets being accessed by many users on a network, it's necessary to ensure that several users aren't making conflicting changes to the spreadsheet and overwriting one another's data on the disk.”

The network server software and node licenses of Release 2.2

(continued on page 18)

Lords of the token-ring



Token-ring interface war being waged on all fronts

Vendors use prices, service to win market share.

By Laura DiDio
Senior Editor

FRAMINGHAM, Mass. — In an effort to gain ground in the competitive market for token-ring interface equipment, a handful of vendors have resorted to steep price-cutting to gain market share, while others are trying to weather the storm by selling added value.

The marketing tactics have effectively stratified the industry into two distinct segments. At the low end, a fierce price war is raging among vendors, such as Racore Computer Products, Inc. and Western Digital Corp., that offer eight-bit boards with limited memory, usually 2.8K bytes (“Token-ring adapter card suppliers wage price war,” *NW*, March 27).

At the high end of the market, vendors such as 3Com Corp. and Proteon, Inc. are trying to lure users away from IBM by offering increased functionality and full service and support.

Other vendors, most notably NCR Corp., possess the manufacturing capabilities and technical sophistication to target both segments of the market.

Last November, NCR became the first third-party vendor to cut prices on its eight-bit boards; in January, the company lowered the cost of its 16-bit adapter following a similar reduction by IBM.

3Com's yardstick

3Com is currently reviewing its price structure in relation to IBM's recent reductions on its 4M bit/sec adapters, and it will make a decision on whether to cut adapter prices within the next two weeks, said Bill Swift, 3Com's manager for token-ring products.

3Com's 3C603 16-bit card with 16K bytes of memory currently costs \$595. “We're not overly concerned about other third parties; IBM is our yardstick,” Swift said.

Six months ago, the average price of an IBM 4M bit/sec token-ring adapter was about \$830. Now it's down to roughly \$650, Swift said.

Proteon, Sytek, Inc. and London-based Madge Networks, Ltd. have said they will hold the line on prices. However, those vendors are adopting various strategies to distinguish themselves from their rivals.

Proteon sells three versions of its ProNET 4 4M bit/sec token-ring adapter: the p1340 model, which is an eight-bit adapter with 18K bytes of memory for IBM

Vendors are adopting various strategies to distinguish themselves from their rivals.

▲▲▲

Personal Computers; the p1345 Bus Master, which is a 16-bit adapter with 18K to 40K bytes of memory for IBM Personal Computer ATs; and the p1840 Bus Master, which is a 16-bit adapter with 18K to 40K bytes of memory for the IBM Micro Channel bus-based IBM Personal System/2s.

The p1340 and the p1345 sell for \$695 each. The p1840 costs \$750.

“It's difficult to play against IBM on a level field and win,” said Proteon President Patrick Courtin. “Therefore, we're targeting users who want a value-added solution with network management capabilities that let them modify their networks without having to disconnect and reconnect wires.”

Madge Networks has adopted a similar strategy, namely offering users interfaces priced comparable to IBM's with more mem-

(continued on page 18)

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Texaco looks to net technology

continued from page 19

Eventually, Metzger said, Texaco would like to use this network to support unmanned gas stations that are open around the clock. Motorists could insert debit cards into the pumps and fill their cars with gasoline. These stations would be controlled, monitored and stocked with gasoline with the aid of integrated information systems.

This would improve cash flow because money would be directly transferred from customers' bank accounts. The stations would also give Texaco a marketing edge by making it easier for motorists to buy gasoline 24 hours a day.

Utilizing capital

Running Texaco more efficiently by integrating disparate information systems is part of a larger strategy that Metzger said is driving the company — finding better ways to exploit capital.

"Information, like any capital, is simply an asset that can be exploited more effectively," he

said. "We think there are great opportunities for us to use our assets to generate more revenue."

Along those lines, Texaco is working to give carriers rights to

by using the collective bargaining power of the thousands of pay phones in its service stations.

For Metzger, a 1969 Rice University graduate and former airborne troop trainer for the Texas National Guard, getting the most out of assets is simply prudent



Texaco's network management center in Bellairs, Texas

install communications lines along its gas and oil pipelines, Metzger said. Texaco is also examining ways to negotiate better deals with long-distance carriers

business. "Texaco has an unusual mix of capital that can be used to make this company more money if we approach it creatively," he said. □

Getting a lot out of conferences

continued from page 19

this can limit a conference attendee's productivity. If a person wanted to visit each booth over the course of a typical three-day conference, he could only average five minutes per visit.

The only realistic approach is to draft a plan that identifies the top five or 10 vendors one intends to visit for an in-depth talk.

Beyond these vendor-specific visits, the attendee should set aside time to walk around. The purpose behind this is to allow for investigation of new vendors or products. This means turning off of the major exposition boulevards dominated by the big vendors and slipping down the back alleys, where the less-established, entrepreneurial start-up companies may have some unique new offerings.

Well-prepared attendees should also devote time to serious reflection over what material they've gathered that day once

they get back to the hotel room. A manager should set aside time to sift through the collected literature and think about the applicability of these products.

Toss out material that has little chance of further consideration. For material that holds interest, the manager should think up some solid applications for the product and make notes. If any questions come to mind, the manager should revisit the vendor the following day.

As with the exhibits, an individual can't hope to visit all the conference sessions, panels and lectures. A conference-goer could comfortably attend three of these sessions a day.

Once again, planning makes all the difference. An attendee must review the scheduled topics and establish a priority list. An individual has to review the curriculum with a careful eye for topics, format and speakers.

Often, these sessions list the topic and mention a well-known telecommunications name as the moderator or panel chairman.

This can mean that the well-known person simply introduces the lesser known panelists, whose presentations take up the bulk of the session.

It is equally important in these evaluations to consider the speaker's background. Is this a user who will give insights from experience or a vendor who will just pitch the firm's products?

Some attention should also be given to the structure of the meeting. It might be a straight lecture or an open panel discussion.

Despite all this preparation, individuals can still end up at sessions that don't meet expectations. Rather than languishing there, attendees should have an alternative meeting in mind. They shouldn't feel awkward about walking out of a presentation that isn't meeting their needs. Conferences provide significant opportunities for the manager to stay current with the industry. However, proper planning determines whether the experience proves to be enriching or a waste of time. □

Planning key to succession

continued from page 19

Network World. The rapid pace of technological change and the growing importance of networks mean communications departments are constantly expanding. Companies need to find workers with specialized technical skills as well as managers to supervise them.

Succession planning ensures that companies can maintain a degree of continuity within a critical segment of their business operations.

"Communications is constantly changing, requiring managers to adapt to changing job skills and requirements," said John Morrison, vice-president of voice and facilities planning at Arlington Heights, Ill.-based Sears Technology Services, Inc., which provides voice and data services for Sears, Roebuck & Co. business groups.

"Succession planning helps senior-level people make more informed decisions when filling openings or new positions," Morrison said.

Employees benefit

Succession planning is a boon for employees as well, according to Phil Evans, director of the 22-person telecommunications staff at chemical and equipment manufacturer FMC Corp.'s data center in Dallas.

"Succession planning gives

potential successors a goal to shoot for and stimulates their interest in gaining a broader understanding of communications outside their specialty," Evans said.

At FMC, potential heirs apparent — as Evans calls candidates for future senior-level positions — are given the opportunity to work in different departments so they can gain a broader understanding of company operations and practices.

Software aids

The effectiveness of succession planning depends on whether candidates identified for future senior-level slots receive the developmental training they need to fill positions when they become available, said Ren Nardoni, president of Nardoni Associates, Inc., a human resources consulting firm in Lebanon, N.J.

But often the voluminous paperwork involved in succession planning prevents companies from tracking whether these candidates are getting that training, he said.

"It's no good identifying potential successors if they are not prepared to handle the job by the time it opens up," Nardoni said.

Nardoni said computer software for succession planning, which costs anywhere from \$8,000 to \$25,000 and is used by two-thirds of Fortune 1,000 companies, helps cut through the paperwork so firms can focus on tracking the development of future candidates. □

Dialogue

continued from page 19

phone companies to their own vulnerability. Most have been scrambling to minimize the impact of potential disasters, but whether they have done enough to avert a crisis is another question. There are 20,000 central offices in the U.S., many of which are comparable to Hinsdale in design.

"Few phone companies have been able to move beyond the planning stages and install equipment or facilities that would make another Hinsdale impossible."

John Morrison

Vice-president of voice and facilities planning

Sears Technology Services, Inc.
Chicago

"Hinsdale removed any complacency the RBHCs might have had. Nynex [Corp.] is installing a fiber bypass net that will allow it to reroute traffic around any failed central office in New York City and [the net] will be finished this year. Nynex has also recommended to large clients that they route data traffic through several different central offices."

Ray Smalley

Director of communications planning
Security Industry Automation Corp.
New York

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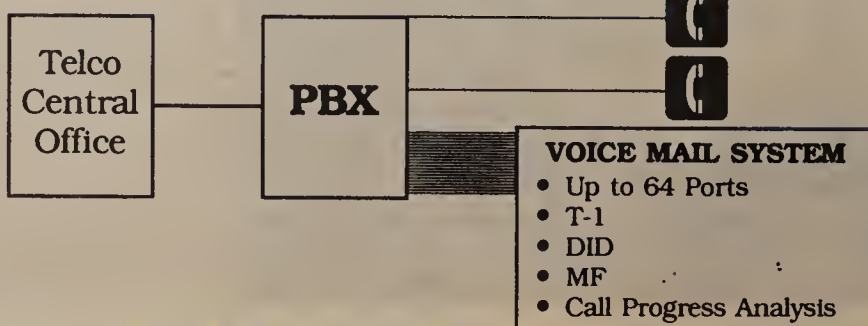
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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

Worth Noting

Next week: A *Network World* Buyer's Guide examines the growing flexibility of LAN analyzers and testers.

First Look

X.25 software supports AutoSync

Tropical Communications Associates, Inc. recently released software that works with dial-up modems supporting Hayes Microcomputer Products, Inc.'s AutoSync protocol to let IBM Personal Computers access X.25 nets without an X.25 adapter board.

The company's **pcX** software runs on Personal Computers with at least 384K bytes of random-access memory and performs packet assembler/disassembler functions.

The software works with AutoSync-compatible Hayes and Data Race, Inc. dial-up modems that operate at up to 9.6K bit/sec and support Hayes' AT command set. AutoSync eliminates the need for an adapter board typically used to enable asynchronous Personal Computers to operate synchronously.

With pcX and an AutoSync-compatible modem, Personal Computer users can access public X.25 networks and establish up to 20 concurrent sessions with one or more host computers running X.25 software. Two of those sessions can be concurrently displayed in windows.

Modems supporting AutoSync include Hayes' Smartmodem 2400, Smartmodem 2400B, Smartmodem 2400Q, Smartmodem 2400P, V-series Smartmodem 2400, V-series Smartmodem 2400B, V-series Smartmodem 9600 and V-series Smartmodem 9600B. Data Race's PC Race 24, PC Race 24/48 and PC Race 24/96 also support AutoSync.

The pcX software is available now for \$295 per copy.

Tropical Communications Associates, Inc., P.O. Box 7057, Delray Beach, Fla. 33484, or call (407) 498-1302.

3Com offers software, two routers

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — 3Com Corp. recently announced two Ethernet routing bridges, or routers, as well as a software upgrade that provides routing capabilities for its existing line of internetwork bridge (IB) products.

The two new routers are additions to 3Com's NETBuilder IB line of Motorola Corp. 68020-based bridges.

According to 3Com, the new IB/2000 and IB/2001 are compatible with the existing IB/1, IB/2 and IB/3 bridges, but they offer 70% better performance compared to the earlier line. The bridges can forward 10,000 data packet/sec and filter 22,000 packet/sec.

Intelligent path selection

Routers are hybrid products that essentially maintain the protocol transparency of simple learning bridges while offering the intelligent path-selection capability of routers. By doing so, they avoid limitations that users of bridges or routers encounter.

"We believe they are the next

"The software adds some of the capabilities of routers without the complexities."

▲▲▲

generation of bridges," said Bobbi Murphy, a manager of internetworking products at 3Com.

The typical bridge is self-learning. "You plug it in, and it figures out where things are," Murphy said. Bridges operate at the media access control sublayer of the data-link level in the seven-layer Open Systems Interconnection model and regulate traffic between network segments according to the destination address of the data packets. The transport protocol is ignored.

While bridges are relatively simple to use, they cannot monitor packet protocols or define who has access to what. They do not operate efficiently in a complex internetwork configuration because they cannot make intelligent decisions about path alternatives. Routers, on the other hand, will select the optimum network path to avoid loops and

can be used to set up logical network segments, each of which runs a different network protocol. The protocol processing makes routers slower than bridges, however, and they are much more difficult to install.

"With routers, the person who designs the network has to know all the routes and addresses," Murphy said. "What we are trying to do [with the new software] is add some intelligence to bridges while maintaining their simplicity. The software basically adds some of the capabilities of routers without introducing the associated complexities."

Routing decisions

The new IB software, Version 2.0, provides the IB bridges with a number of routing features. One is the ability to select the optimum path among a number of alternatives by supporting the Spanning Tree Algorithm (STA). STA, an IEEE draft standard, uses either administrator-defined criteria or built-in default conditions to make routing decisions.

If the selected path goes down, STA automatically selects another path and reconfigures the internetwork. The ability to account for topology and recover from net failures helps increase internetwork reliability, Murphy said.

To design the same topology with routers would require skilled network management personnel for each segment in the internetwork, Murphy said.

Version 2.0 also enables IB bridge users to create custom filters, which examine the packets and forward or reject them according to preprogrammed conditions. Such conditions could include packet length or protocol type or electronic mail domain, for example.

Network administrators can use the filters to limit specific traffic to a certain network segment and thus set up a secure network domain. The filters can also be used to optimize internetwork performance by allocating traffic according to the respective bandwidths of various links.

Pricing

Both routers are available now. The IB/2000, which connects to thick Ethernet cabling, sells for \$5,250. The IB/2001, which supports both regular Ethernet cabling and ThinWire Ethernet, costs \$5,650.

The Version 2.0 software is currently included with the IB/2000, IB/2001 and IB/2, as well as newly purchased IB/1 and IB/3 bridges. Current users of IB products can obtain the software upgrade free of charge.

Users can reach 3Com by writing to 3165 Kifer Road, Santa Clara, Calif. 95052, or by calling (408) 562-6400.

File-transfer service added to E-mail net

DA Systems service enables users on disparate E-mail networks to exchange ASCII, binary files.

By Jim Brown
New Products Editor

CAMPBELL, Calif. — DA Systems, Inc. will announce this week a service that enables users of various public or private electronic mail systems to exchange binary and ASCII files.

With DA Systems' DASnet Inter-System File Transfer service, users of disparate E-mail systems can exchange spreadsheets, graphics and electronic data interchange documents via an E-mail net. Existing DASnet service supports message exchange between 22 public and most private E-mail systems.

DA Systems developed IBM Personal Computer-based file-conversion software with funding from Connect, Inc. of Cupertino, Calif., NichiBei Kaiwa Gakuin/IEC of Tokyo and Patelcomp, Inc. of Cincinnati. These companies are seeking to offer intersystem file-transfer services.

DA Systems' software is being

integrated into the Connect Professional Information Network; Dialcom, Inc.'s Dialcom; MCI Communications Corp.'s MCI Mail; Telenet Communications Corp.'s Telemail; NichiBei Kaiwa Gakuin/IEC's Twics; and Patelcomp's Unison Telecommunications Service nets. Users of these systems will route files to DASnet as if the files are destined for a user of the same system. DASnet converts and delivers those files.

Other users can run Personal Computer software to translate files to a DA Systems E-mail message that is routed to the receiver, where similar software converts the file to the appropriate format.

There is no sign-up fee for current customers to use the service. DA Systems is giving software to its customers until June, after which it costs \$15.

Users can reach DA Systems by writing to 1503 E. Campbell Ave., Campbell, Calif. 95008, or by calling (408) 559-7434.

CompuServe unveils 9.6K bit/sec access to X.25 net

COLUMBUS, Ohio — CompuServe, Inc. recently announced a service that enables users with asynchronous modems to access its X.25-based packet network at 9.6K bit/sec over dial-up lines.

CompuServe said customers with V.32-compatible modems supporting up to Class 4 of Microcom, Inc.'s Microcom Network Protocol can access a central CompuServe packet switch via an 800 number. The company plans to expand the service to major cities this year, enabling users to access the CompuServe net at 9.6K bit/sec by dialing a local number.

Users with 30-day contracts pay \$19 an hour for the 9.6K bit/sec dial-up service, while customers with longer term contracts pay \$16 an hour.

CompuServe also announced that it has teamed up with Packet/PC, Inc. to offer software that allows IBM Personal Computers to access IBM System/3X or Application System/400 (AS/400) minicomputers via CompuServe's net. Packet/PC's Packet/5250 software runs on Personal Computers and works with Packet/94 software running on System/3Xs or AS/400s.

Packet/5250 enables Person-

al Computers to generate EBCDIC data that is transmitted asynchronously to the nearest CompuServe switch, which transmits it to the host site in an X.25-based packet. Packet/94 software emulates an IBM 5294 cluster controller supporting up to 40 concurrent sessions and converts packets to a 5250 data stream.

Packet/5250 costs \$295. Packet/94 costs \$8,000.

CompuServe also enhanced its on-line network management service, which enables its customers with ASCII terminals to access CompuServe network monitoring and administration equipment at up to 9.6K bit/sec via dedicated or dial-up links. The upgrade enables users to access CompuServe switch diagnostic information in real time, including data on link and usage status, error rates and link utilization.

The service also enables users to directly enter trouble tickets, orders to add new sites to a network, and changes or additions to end-user password codes. The service is free.

Users can write to CompuServe at 5000 Arlington Center Blvd., Columbus, Ohio 43220, or call (614) 457-8600.

OPINIONS

DEFINITY 75/85

BY LEWIS MORETSKY

AT&T's migration path is as clear as mud

For four or five years now, telecommunications professionals have awaited the announcement that AT&T's System 85 would be discontinued and the System 75 would be expanded and upgraded. At a recent AT&T seminar entitled "Premise Architecture Definity 75/85," consultants received information from AT&T implying that this is the company's intent.

At the beginning of the seminar, an AT&T spokesman said the announcements would show "the clear migration paths for all System 75s and 85s." While AT&T must be given credit for not leaving its System 85 users stranded, the *base* price to upgrade from a System 85 Release 2 Version 1 to a Definity Generic 2 is \$69,000; for Release 2 Version 4, the cost is

somewhat lower: \$31,000. But for lucky System 75 users, the cost of upgrading to a Generic 1 is only \$8,500.

Not only is the cost of upgrading from a System 85 relatively high, the process could result in an additional cabinet requirement and even more cost to the user. Also, according to AT&T, both System 85 and System 75 users may have to swap

out some vintage circuit packs at an additional cost.

AT&T estimated the installation time required for upgrading from a System 75 to a Generic 1 at a few hours. However, the company declined to provide any information on the upgrade from a System 75 to a Generic 2.

The rated number of call attempts per busy hour for a Generic 1 has been increased to 7,200, which is welcome news. However, the Siemens Communications Systems, Inc. Saturn IIE and the new Hitachi America, Ltd. HCX 5400 are both rated at 10,000 call attempts per busy hour. As a competitive product, the Generic 1 still seems to fall short.

Those of us who have been in the industry since before the Carterphone Decision have experienced the cost of adding to older equipment. It's sometimes less costly for users to stay with what they have and purchase new, reliable equipment later, rather than upgrade to a patchwork system.

Because the "clear" migration path from a System 85 to a Definity Generic 2 requires expanded cache memory, a disk tape system, combined common control/time multiplexer, new software, possible additional cabinets and changeout of vintage circuit packs, users might want to weigh their alternatives. Compare the upgrade cost with the cost of a new Definity Generic 2 or, for that matter, another manufacturer's product.

AT&T's new systems will be available by midyear, while the upgrades will be available, according to another AT&T spokesman, "late in the last quarter, but realistically in 1990." Industry analysts expect competitor Northern Telecom, Inc. to respond to the Definity by announcing that it will ease the transition from the SL-1 to the SL-100. Northern Telecom will probably not only downsize the SL-100, it will likely increase the size of its Meridian Norstar. The company's Norstar marketing plan has made the product one of the best kept secrets on the market. Given its present selling price, the Norstar's potential for sales seems tremendous.

For AT&T to provide the illusion of "clear migration paths for all System 75s and 85s" must be tremendously costly. Perhaps this money could have been better spent improving these migration paths. ▀

Moretsky is president of The Upton Group, a Boston-based telecommunications consulting firm with offices in Chicago, Houston, Los Angeles and Kansas City, Mo.

NETWORK WORLD

The Newsweekly of User Networking Strategies

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An IDG Communications Publication

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EDITORIAL

Price caps will change the industry for the better

The recent Federal Communications Commission decision to adopt price caps as a means of regulating AT&T represents a radical shift in telecommunications policy.

However, analysts, AT&T and even the FCC itself say that last-minute revisions encouraged by Congress — price floors to guard against predatory pricing — limit the usefulness of the price cap plan.

Poppycock.

With or without price floors, the price cap plan gives AT&T an unprecedented degree of pricing latitude, and it will fundamentally change the industry for the better. After all, AT&T still sets most pricing standards.

The price cap plan groups AT&T's services into three so-called baskets:

- Business services, including Pro America, WATS, MegaCom, Software-Defined Network, voice-grade private lines, wide-band private-line services and other switched services.

- 800-number toll-free services.

- Residential and small business services, which include Message Toll Service (MTS), international MTS, Reach Out America, and operator-assisted and credit-card calling services.

Revenue growth for each basket is limited to the rate of inflation minus a productivity factor devised by the FCC.

For the first four years of the plan, revenue growth for each basket will be capped at 3% be-

low the inflation rate. AT&T can raise or lower rates for services within each basket by 5% a year, as long as the collective revisions do not increase revenue for the basket by more than the permissible amount. (A special provision limits price increases for night and weekend MTS services to 4%.)

The price floors — which prohibit AT&T from dropping the price for any service by more than 5% per year — are meant to keep AT&T from pricing services in a predatory manner,

Price caps give AT&T flexibility to compete with increasingly strong carriers.

▀▀▀

that is, dropping the price of services that face stiff competition and driving up the cost of services that have little competition.

Although some observers say the final price cap package came with too many strings attached (an impression AT&T likes to foster in its ongoing quest for total deregulation), consider what AT&T is free to do today.

Because the FCC lumped all but one business service (800 service) into a single basket,

AT&T will be able to use its pricing strategically. For example, the International Communications Association is concerned that AT&T will continue to drive up the cost of private-line services while dropping switched service rates in an attempt to migrate private-line users onto the switched network, which is less expensive to maintain.

Furthermore, the price floors, intended to limit the amount AT&T can cut prices, actually have a trapdoor. Although AT&T is supposed to keep its price cuts within the 5% limit, it can exceed that amount by going through a justification procedure involving a 45-day tariff review that requires AT&T to prove the tariff is lawful.

All told, AT&T got more with price caps than it will admit (a by-product of 100 years of regulation — never celebrate any bone tossed your way). The industry will begin to see the ramifications by the end of the year.

It is high time for this type of reform. While falling short of full deregulation, price caps give AT&T the flexibility it needs to compete with a number of increasingly strong carriers, regardless of the more nefarious interpretations of what AT&T will do under the plan.

But, although AT&T's chief rivals, US Sprint Communications Co. and MCI Communications Corp., are healthy and getting more so with each passing month, it would be premature to fully deregulate AT&T. ▀

OPINIONS

THE NETWORK CONTROL CENTER

BY RONALD STELLHORN

Expand the role from watchdog to nerve center

What do hot air balloons and network control centers have in common?

During the Civil War, the use of hot air balloons for aerial surveillance enabled military strategists to get a view of more than just isolated happenings along a battlefield. This early venture, which had been subject to much scorn and ridicule, has since evolved into the use of U2 spy planes, SR71 reconnaissance aircraft and satellites, which collect information on the widest scale possible.

Would you believe that you may have your own eye in the sky right in the heart of your information systems organization? If you have a network control center, a help desk or any central location that receives telephone calls from people asking for help with computer- or network-related problems, your eye in the sky is already in orbit.

Wouldn't it be useful to be able to identify network-related problems as they occur and take action to minimize the impact? How about preventing network performance bottlenecks from developing as traffic increases over time? And what about isolating data base file management problems before hours or days of activity are lost?

When you stop and think about it, where do the first indications of these kinds of problems appear? You guessed it: They show up as telephone calls to the network control center.

The problem is that users don't call and report performance bottlenecks or data base file management problems as such. Rather, their reports describe inactive terminals, poor response times or garbled output.

Taking action

How can users translate these calls for assistance into swift action directed at the source of the problem? An excellent start would be to expand the role of the network control center.

For example, the network control center can readily handle problems that are related to

a network facility failure. That is, if a data link has become inoperative or inefficient, or a modem has failed, there are some good network management tools available to detect these types of problems.

But what about the problems that are not so obvious? These include such situations as when many users attempting to access the same data begin to experi-

problems just won't do any more. It makes little sense to disrupt the operations of entire information systems departments when additional skills provided to the network control center could produce the same result.

It is essential that potentially serious situations be identified as rapidly as possible in order to minimize the damage to the cor-

It is essential that potentially serious situations be identified rapidly to minimize damage.

▲▲▲

ence a slowdown in response time or when they begin to see cryptic error messages from application programs indicating the application data is developing an abnormal condition. For the most part, the network control center is ill-equipped to provide any meaningful assistance in these types of situations.

Because of its function, the network control center is the first information systems organization to become aware of any chronic situation developing in the network.

It can take advantage of these early warnings by taking immediate action, or it can assign the problem elsewhere. But rather than assigning these kinds of problems to another information systems organization, the network control center could have in place a "SWAT team" consisting of specialists who evaluate data base, system and network software problems.

The members of the SWAT team would be skilled in recognizing critical situations. They would also be qualified to initiate remedial action where necessary.

In addition, the team would provide the problem management leadership if additional resources were brought in from outside the net control center.

Old ways won't do

Why go to all of this bother? Why not just assign these problems to another information systems area and take the network control center out of the picture?

The old ways of resolving

poration's greatest assets: business information and the means to disseminate it effectively.

A network control center SWAT team would have the necessary evaluation tools and could react quickly. Otherwise, by the time the problem is assigned to another information systems area and evaluated, much of the information concerning the problem may no longer be available and meaningful corrective action may not be possible.

Is this a radical approach? Not if you want to keep your highly paid system and application software people focused on developing better business solutions, rather than on solving problems that can be handled less expensively.

The network control center staff specializes in solving all kinds of problems. Users should take advantage of these special skills whenever possible. The control center staff can be more productive than other information systems groups, which see day-to-day problem-solving activities as secondary to developing better business solutions.

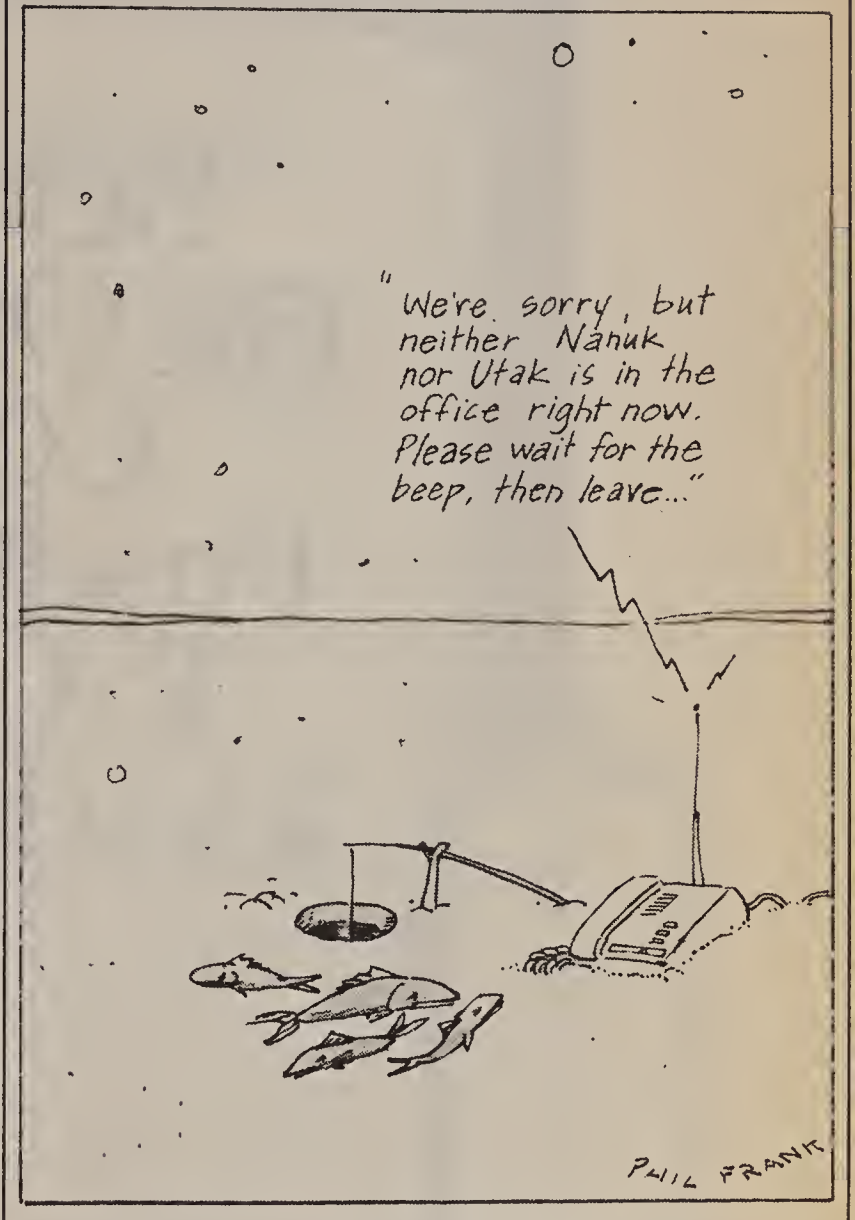
Let's reap the benefits of the information that the eye in the sky — the network control center — provides about our corporate business systems. Expand the control center's role from that of a technical network watchdog to that of a business applications nerve center.

The information systems department must find fresh approaches in order to fulfill its mission in our rapidly changing corporate environment. ■

Stellhorn is manager of network support services for Mid-Con Corp., a subsidiary of Lombard, Ill.-based Occidental Petroleum Corp. that owns and operates natural gas pipelines.

TELETOONS

BY FRANK AND TROISE



LETTERS

Benefits of ANI

Your editorial "What are the rights of telephone users?" (NW, Feb. 27) seems to miss an often overlooked point regarding consumer rights and the issue of automatic number identification (ANI).

Although I strongly agree that telephone users with unlisted numbers should be entitled to protection from ANI schemes, I also believe ANI will benefit the majority of residential telephone users with listed phone numbers.

Based on a completely unscientific poll I recently conducted of my neighbors and associates, I think it is safe to say that many of us are also becoming increasingly con-

cerned about technology and privacy issues.

Although it will probably be argued that ANI will lead to the "Big Brother" syndrome, where we are the watched, I would counter that it is equally possible ANI will enable us to do the watching.

My reasoning is this: ANI, for the first time, could actually provide the residential cus-

(continued on page 44)

Network World welcomes letters from its readers.

Letters should be typed, double-spaced and sent to Editor, Network World, 375 Cochituate Road, Box 9171, Framingham, Mass. 01701.

Letters may be edited for space and clarity.

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Columns should be timely, opinionated, literate, thoughtful and accurate.

Manuscripts should be letter-quality, double-spaced and between 600 and 900 words in length. Disk or modem submissions are preferred.

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INSIDE THE INDUSTRY

DCA: More Than Just Irma

122 Computer Systems News

...and with new products and acquisitions

PRODUCTS

Monday, November 14, 1988

DCA Links Macintosh To Mainframe

New Software Dovetails With A

Computing Strategy

BY JOHN THOMPSON

ANAHEIM, CALIF. — Digital Communications Associates Inc. has introduced a software package for Apple Computer Inc. that lets IBM mainframe applications data be accessed on a Macintosh using that system's graphical format.

The software package could prove to be a key element in Apple's strategy of making its business commu-

popular graphical

"It gives Mac

face the Macint

The package

Apple's MacV

3270-like et

then able to

A Pocket Guide to DCA's Workstation Communications

DFT

File Transfer

APA Graphics

MCA/PCA

Macintosh

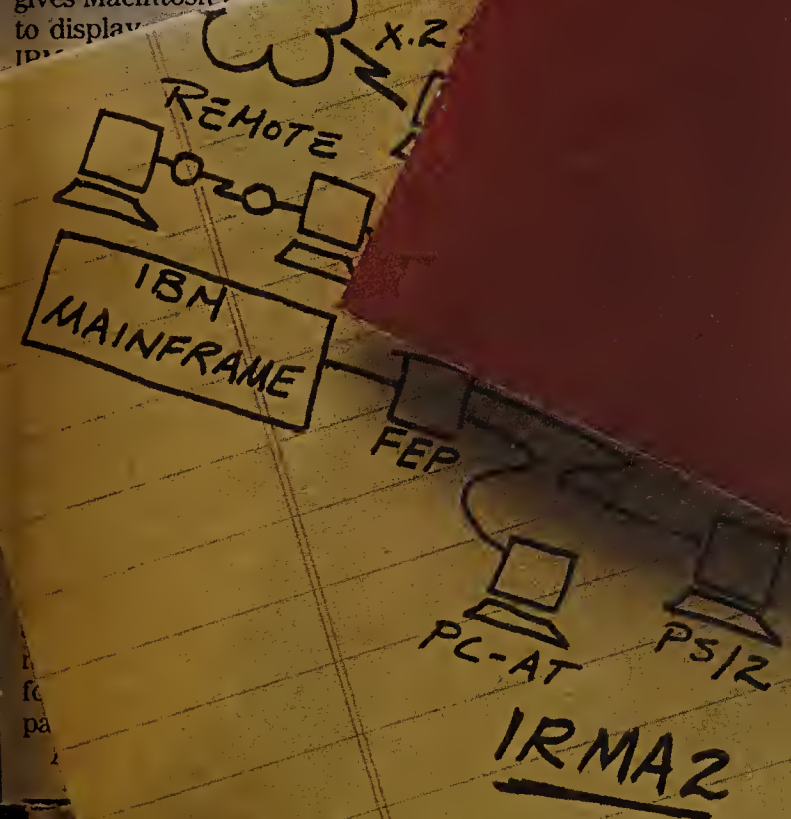
Asynch Communications

DCA (Workstation Communications)

DCA To Bring Mainframe Graphics to Mac

By Jane Morrissey and David

Digital Communications Associates Inc. intends to be the first off the block with software that gives Macintosh users the ability to display IBM mainframe



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DCA



Apples and oranges, text and graphics

By JANET FIDERIO

Business applications today use types of information that are as dissimilar in character as apples and oranges. Yet those types of information can coexist electronically in compound documents.

To find an example of a compound document, look at any newspaper or magazine that contains graphics or images as well as text. An electronic compound document contains those same elements, but it stores them in one complex file that encapsulates text, page dimensions, layout specifications, images, graphics, spreadsheet data and other information. In a few years, these documents will also support voice and video annotation.

Digital Equipment Corp. is betting that not only publishing

Fiderio is a free-lance writer based in Gilsum, N.H.

professionals but also traditional business application users will see the value of an open protocol for interchanging, linking and updating mixed media files. The company recently announced two products with this capability and is actively courting third-party support for its Compound Document Architecture (CDA).

Although DEC's CDA is more full-featured than competing architectures and DEC is currently the only vendor to publish an open specification, the company does face competition.

"Every major manufacturer out there now has the requirement to pass reusable compound documents through its systems," says Bob Christie, senior staff consultant at Omnicom, Inc., an Open Systems Interconnection consulting firm based in Vienna, Va. "It's almost a written law of the industry today. Users are going to be moving compound documents, and whether they contain spreadsheets, geometric graphics, raster graphics or images, users are going to want to interchange them."

Other compound document architectures include IBM's Mixed Object Document Content Architecture (MODCA), also called Office Interchange Architecture, and Wang Laboratories, Inc.'s Information Transfer Architecture (WITA), as well as the

plex document architecture and has provided the most detail to users and software developers. The company provides its published specification free of charge. By publishing the CDA specifications, DEC hopes the interest of users and software de-

With compound document architecture, different media can appear — to the net and the user — as alike as peas in a pod.

International Standards Organization's (ISO) OSI Office Document Architecture (ODA).

So far, DEC has been the most aggressive in developing a com-

velopers will grow. No doubt the company also hopes to influence the unfinished OSI specifications as they develop.

(continued on page 30)

(continued from page 29)

According to Mike Milliken, vice-president and senior analyst at Boston-based Patricia Seybold Office Computing Group, DEC recognizes the role that a compound document architecture will play in today's complex networked systems. By opening the architecture, DEC also recognizes that corporations often support a variety of hardware platforms and that users may want to pass compound documents between these platforms.

"You have to enable your end users to work within a distributed multivendor environment," Milliken says.

Compound problems

In a world full of compound documents, net traffic and bandwidth requirements could increase dramatically. According to David Passmore, a principal of Network Strategies, a practice of Ernst & Whinney in Fairfax, Va., transmitting one compound document may require 10 times the bandwidth necessary to send a file that is strictly character-oriented. Actual bandwidth use will be determined by the type and quality of image or graphic sent.

For example, object-oriented graphics — in which several commands describe a circle, square or other shape — will use much less bandwidth than bit-mapped

ics-oriented applications," Passmore says. "Find out when users expect to implement products that support these new compound document architectures."

meet new user needs and network requirements for the compound document applications that the company plans to use. Glaxo is interested in compound docu-

"You have to enable your end users to work within a distributed multivendor environment," Milliken says.

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For example, at Glaxo, Inc., a pharmaceuticals manufacturer in Research Triangle Park, N.C., bandwidth requirements will quadruple over the next few years to

ments because many of the reports and papers it publishes contain chemical formulas, time-sequence graphs and various types of tabular spreadsheet data.

Currently, nontextual information is hand-drawn or embedded in files, only to be seen at the last minute before production, when revisions are difficult. Since many of these reports have lasting value and are updated regularly, Glaxo's publishing would be streamlined if graphics and word processing applications were linked. In this way, when source data such as spreadsheet or formula data is changed, the corresponding data found in documents would change automatically.

"There are programs out there that help us generate graphics," says Allen Richon, manager of Glaxo's research systems, "but we need to integrate those graphics with our word processing applications."

Richon says he thinks Glaxo would save a lot of time and effort with networked

Transmitting one compound document may require 10 times the bandwidth necessary to send a file that is strictly character-oriented.

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graphics, such as a scanned photo or a facsimile document. Color images will also use more network resources than black-and-white images. In fact, color images can take three times the bandwidth of the same image represented in gray scales.

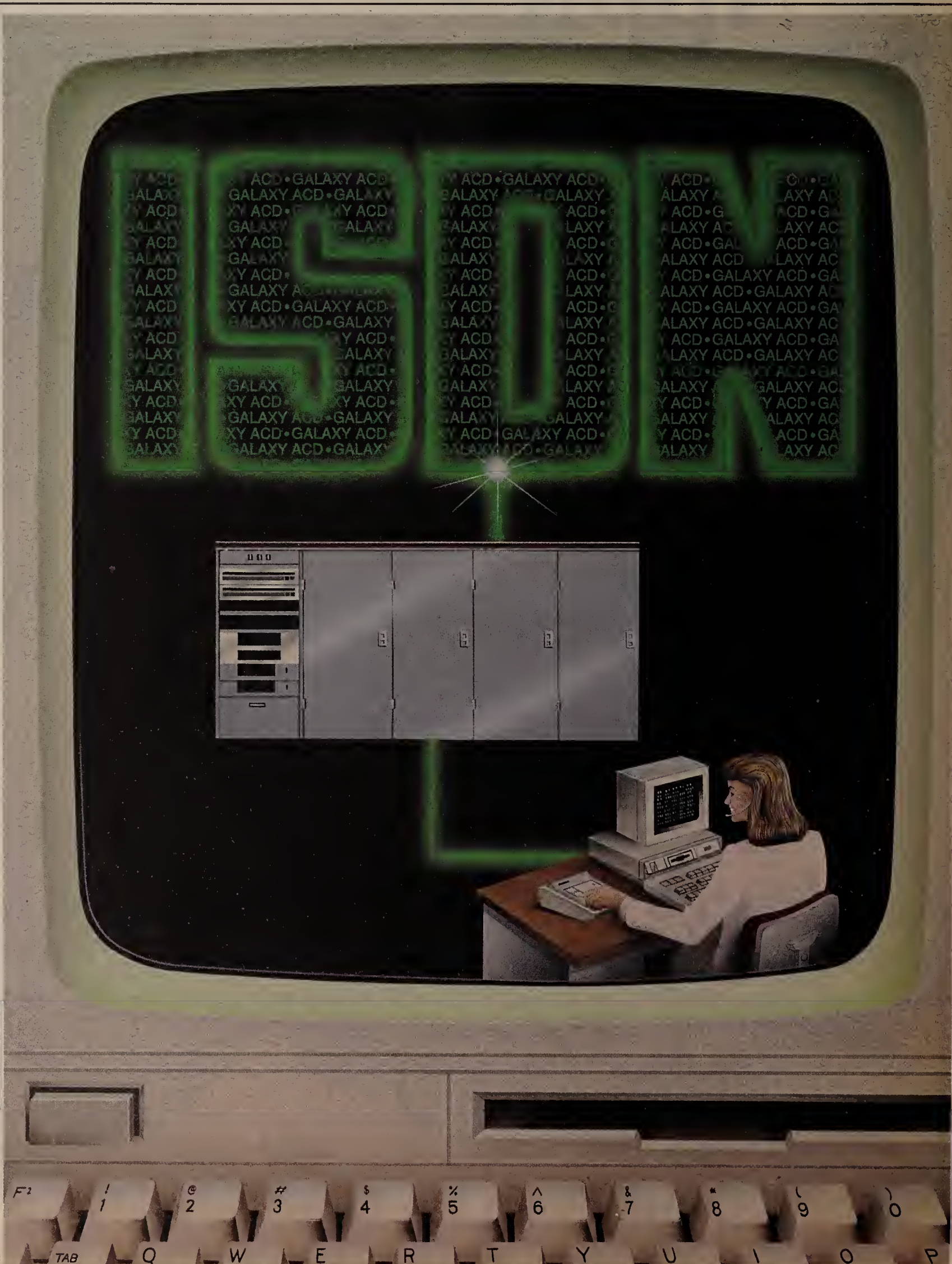
Jackie Kahle, manager of marketing, electronic publishing systems at DEC, doesn't think these increased capacity requirements will call for dramatic changes.

"Increased use of imaging for electronic publishing as well as other applications will put network loads on the system as they are implemented," Kahle says. "But we haven't yet had cause to be concerned that the networking technologies we offer are incapable of handling that."

Bandwidth requirements don't end with images, however. Voice annotation, when it becomes available, will probably require the most network resources. It takes 8K bit/sec to send one second of telephone-quality voice. With compression techniques, this number can be reduced by a factor of 10. But those seconds add up rapidly in the process of annotating a file.

"Even when you're using compression and lowering voice quality, you're still talking about some files on the order of hundreds of kilobytes," Passmore says.

One way network managers can anticipate resulting increases in demand for capacity is to keep close tabs on users' plans. "Know what users are planning with respect to document production and graph-



workstation-based compound document applications, which would allow writers to change and dynamically disseminate new information to pertinent manuscripts, memos or individuals.

Although the technology is available to move vast amounts of data, not all networks will be able to expand fast enough to meet users' needs. "What will produce problems," Omnicom's Christie says, "is the type of networks we attempt to use [when passing mixed-media files] and how fast we migrate those nets to a true OSI seven-layer stack."

Increased network traffic is only one of the problems managers will face when compound documents become a reality. Perhaps a more pressing problem will be translating from one vendor's compound document architecture to another's.

At Glaxo, for example, business writers create reports using more than 100 IBM Personal Computers connected via a Token-Ring Network and Digital Communi-

running as VAX terminals on an Ethernet. Interleaf, Inc. workstations perform high-end publishing tasks. Since both IBM and DEC have their own compound document

chon says. "What happens if we have MODCA people sitting on the IBMs and the CDA people sitting on the VAX? How will we move documents back and forth and get them to talk to one another?"

If neither DEC nor IBM provides a solution, third-party software developers will likely bridge the gap. But the vendor that performs the transformations will have its work cut out for it.

That's because users are going to have to interchange these documents across different architectures, which is a difficult task, according to Michael Zisman, president of Soft-Switch, Inc., a Wayne, Pa.-based firm specializing in development of cross-vendor connectivity software.

"Writing transformation programs between compound document architectures is a lot harder than writing them between standard word processing files," Zisman says.

"Moving documents in our current environment, with its various filters, such as [Document Content Architecture], will be trivial compared to moving full graphics-oriented functional documents with images and everything else in them," Richon adds.

Since DEC says it will conform to OSI's ODA/Office Document Interchange Format (ODIF) specifications as they develop,

Zisman cautions managers to be wary of vendors that place too much importance on ODA/ODIF compatibility.

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cations Associates, Inc. Irma boards to IBM mainframes. On the other hand, the 100 or more science writers and researchers create manuscripts using Personal Computers

architectures, Richon's users may adopt two different standards.

"The problem we are going to be facing is due to our being a two-vendor shop," Ri-

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Although the technology is available to move vast amounts of data, not all networks will be able to expand fast enough.

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users will be able to use ODA/ODIF as a bridge, the least common denominator between CDA and other architectures that support ODA.

However, the higher level functions of both environments will be lost. Also, Richon points out, OSI compliance must be a two-way street. To use ODA/ODIF as a common denominator, both architectures must support it. Whether other vendors will do so is unclear at this time.

On the other hand, Zisman cautions net managers to be wary of vendors that place too much importance on ODA/ODIF compatibility because the OSI standard is not well-defined yet. ODA/ODIF compatibility doesn't mean users are going to be able to easily interchange documents across multi-vendor systems, Zisman says.

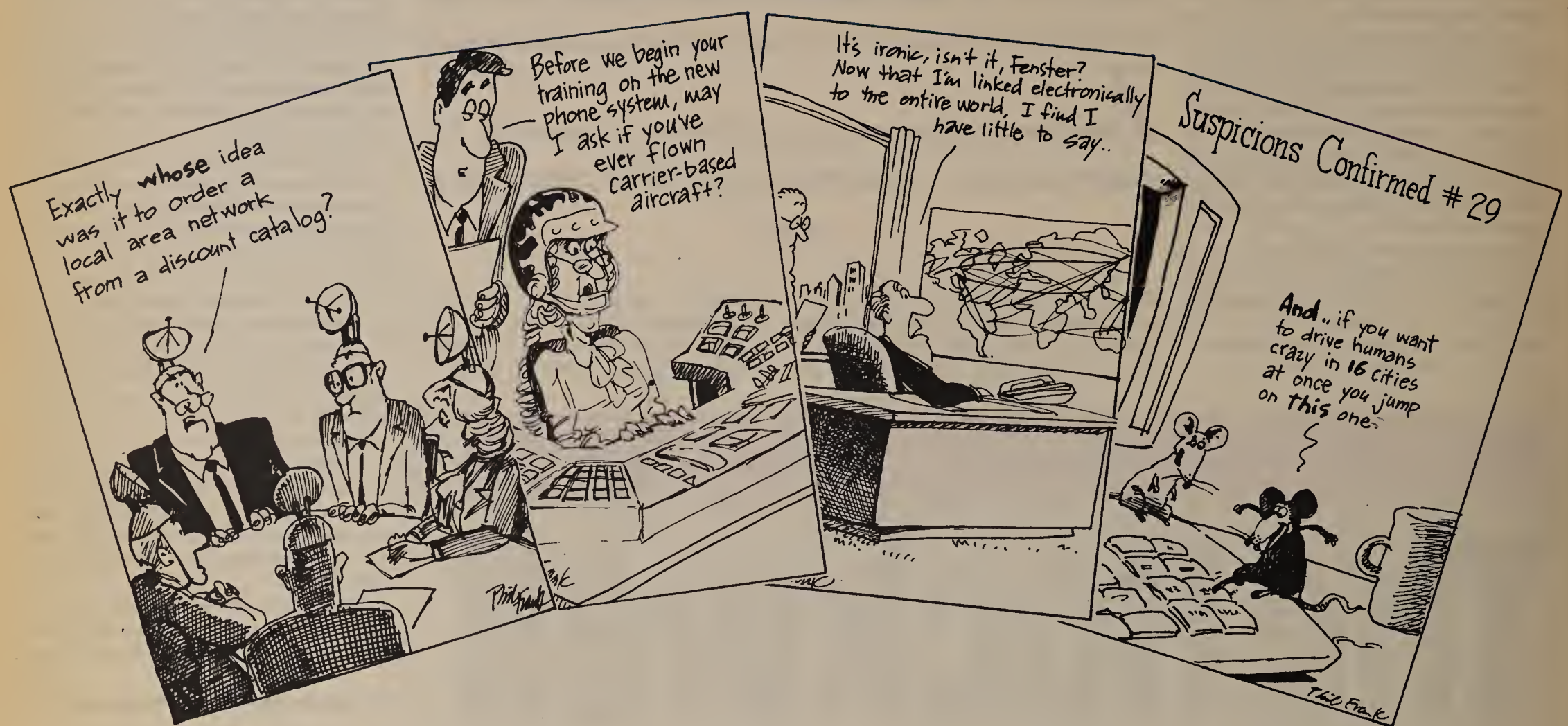
"This doesn't mean that you shouldn't move to migrate toward compound document architecture, because you should," he asserts. "Just understand that the interchange of these documents across systems is going to be challenging."

DEC's architecture

DEC's CDA is actually a superset of ISO's ODA/ODIF specifications. It supplies protocols that let users move documents between Apple Computer, Inc. Macintosh, MS-DOS, OS/2, Ultrix and VAX/VMS applications.

An integral part of CDA is the Digital
(continued on page 40)

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CONTINUED FROM PAGE 1

recognition. What's needed is a standardized mixed-object architecture that can support the creation of integrated applications and provide the foundation for future integrated workstations.

Think for a moment about why integrated applications and workstations are important. Studies have been conducted to show how, on average, support personnel and management spend their time (see Figure 1, page 44). The majority of tasks performed by support personnel can be defined as workstation-oriented, except for the category "other." Close to two-thirds of management's time, except for meetings and travel, is spent on tasks that could be considered workstation-centric.

Unfortunately, today's managers and support personnel must understand and use many different machines and software packages, from telephones to graphics packages, to do their jobs well. This is because each machine handles a different kind of information "object."

Bearing this in mind, the answer to the question "Why integrated workstations?" seems
(continued on page 41)

Guengerich is a senior consultant for Business Systems Group, Inc., a Houston-based consulting firm specializing in networking and distributed data base applications. He is also editor of NetWare Advisor, a technical journal about Novell, Inc.'s NetWare operating system.



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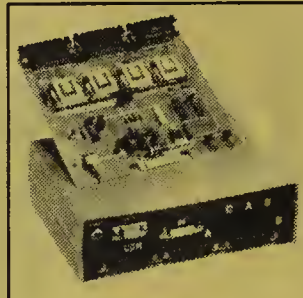
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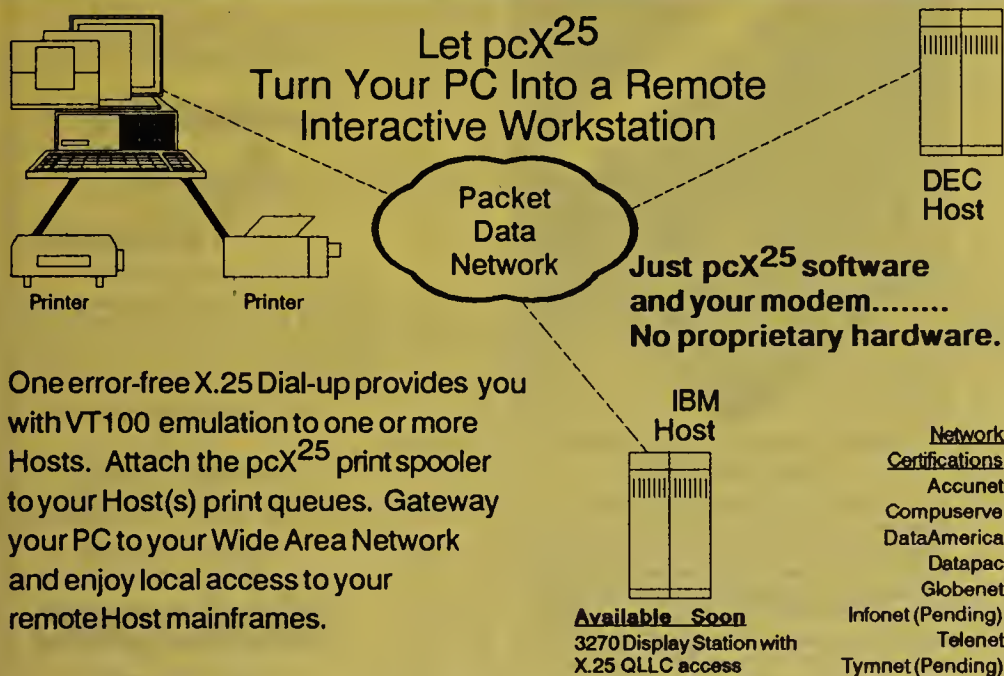


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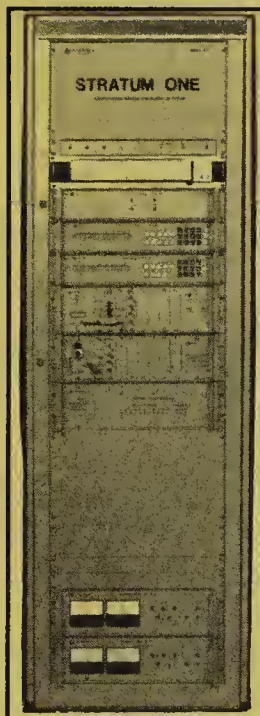
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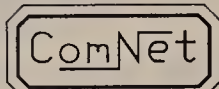
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We are seeking a number of highly qualified candidates in the following areas:

Network Management Architecture

We are seeking both lead and contributing members for an Architecture group responsible for definition and documentation of both abstract and product-specific architectures. Concentration will be on OSI-based Network Management applied to a diverse set of communications and computer system architectures. Standards involvement will be a plus as well as a record of successful transfer of architecture to product design.

Distributed Systems S/W Design

We are seeking both lead and contributing members for a System Design group responsible for definition and documentation of product-specific ar-

chitectures. Concentration will be on OSI-based Network Management applied to a diverse set of communications and computer system architectures. Successful candidates will have a background in distributed systems including workstation-based applications development. Target environments will span workstations, Unix-based minicomputers and mainframes.

S/W Development Methodology

Be responsible for definition and implementation of a state-of-the-art software development methodology for a project developing a distributed network management applications system based on graphics workstations. Responsibilities will involve development of a plan for staged introduction of new software tools (CASE), vendor evaluations, tools selection, and installation and evolution of the environment. This is an opportunity for the successful candidate to operate in a fast-paced, aggressive organization with a strong commitment to building the best in software development environments.

Software Development

As Senior Staff Engineer you will assume responsibility for our application development strategy. You will deal with the challenges of implementing an application subsystem in a distributed, heterogeneous network management system. A strong system design background to handle the intricacies of configuration, fault, performance, accounting and security management in an OSI framework is required for this position. Also required are an advanced degree in computer science, 9+ years of development experience. Network management systems experience strongly preferred.

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UNISYS



PUT ABILITY IN DISABILITY

Support



Apples, oranges, text and graphics

continued from page 31

Document Interchange Format (DDIF), which is similar to ODIF. DDIF provides the specifications for document processing features including logical and presentation attributes, attribute inheritance, cross-references and live links (called dynamic external references), generic structures, and independent and attached style information.

DDIF supports the X.400 messaging standard and OSI's Abstract Syntax Notation.1 (ASN.1) recommendations. It also supports the Standard Generalized Markup Language (SGML); the Graphical Kernel Subset, an ISO standard; and the CCITT Group IV facsimile standard.

DDIF supports four document types: text, image, graphics and

form, such as style of subheads, page numbers and section delimiters. They also contain layout specifications. DEC supports Adobe Systems, Inc.'s Post Script page description language.

While CDA doesn't currently support video and voice annotation, DEC plans to add support for these services in the future. According to DEC's Kahle, the company will support voice and video when user interest warrants and

when standards bottlenecks dissolve. The CCITT H.261 video specification is one of the unresolved standards in question.

According to Howard Woolf, DEC's manager of Electronic Publishing Systems, CDA is an integral subcomponent of the company's Application Integration Architecture, which is designed to provide interoperability and portability between DEC applications.

CDA is also independent of the windowing system being used. Although the CDA-compliant products that DEC is shipping — DECWrite and DECDecision — use DECWindows, third-party software developers may or may not use it. CDA applications are designed to run over DECnet.

ODA/ODIF, OSI's answer

OSI's ODA, on which CDA is based, is open-ended. In contrast

with CDA, ODA currently supports only three content types: text, or character content; scanned images; and geometric, or vector, graphics.

According to Wally Wedel, technical director at US West Advanced Technologies, Inc. in Englewood, Colo., and a member of the OSI ODA committee, ODA will support video and audio content architecture in the future. In ad-

(continued on page 45)

FINALLY, AN INTEL NETWORK ACCESS 0

Kahle says DEC will support voice and video when user interest warrants and when standards bottlenecks dissolve.

▲ ▲ ▲

computed data. Text consists of ASCII characters and alternative character sets. Graphics content can comprise objects such as cubic Bezier curves, arcs, polylines, fill areas and a combination of all of these elements.

Image content is represented by frames that contain single images or a number of time-varying images. A variety of attributes define the image itself. Document content can be hard, meaning it is created by the user, or soft, meaning it is generated by the application. Files can contain restricted content, such as a page description language, or private notes that may, for example, refer to a user's last revision.

DEC's Tabular Data Interchange Format (TDIF) provides so-called live-link specifications. For example, a live link between a monthly report written using DECWrite and a DECDecision spreadsheet would automatically incorporate spreadsheet changes in the monthly report.

TDIF encodes revisable data tables (such as spreadsheets and data bases) so they can be interchanged across systems. It provides data-table physical layout, logical structure and presentation attributes.

Compound documents that are DEC CDA/DDIF-compatible contain not only document content but various parameters and directives that specify their final





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continued from page 33

clear. Handling multiple objects better means using both time and information better.

In industry, these improvements translate into either saving money or making more of it. And in today's highly competitive global economy, integrated workstations are significant strategic investments.

However, it isn't clear exactly what makes up an integrated workstation. Conceptually, it is the sum of data processing hardware and software supporting a user's business functions. Several years ago, most of the market attention focused on the hardware aspect of this definition. Integrated voice/data workstations were the rage, with vendors such as IBM/Rolm Systems Division, Televideo Systems, Inc., North-

ern Telecom, Inc. and AT&T offering terminals with built-in telephones.

More recently, development has been picking up on the software front with the introduction of applications such as IBM's InfoWindows, which integrates many different kinds of media in a single workstation setting. This movement toward integration is critical to providing a solid foundation for workstation applica-

tions in the years to come.

By definition, integration is the act or process of blending, forming or coordinating something into a unified whole. Within the context of DP, integration involves several sought-after features, including:

- Providing a seamless, transparent boundary between application file structures.
- Communicating between dissimilar environments.

■ Combining various objects into discrete, revisable sets of content or meaning.

Different levels of software provide each of these complex features. Systems integration as an end goal, though, is simple: Retrieve the required information, transparent of location or form, in a format that most efficiently and effectively satisfies the business objectives and needs of today's busy worker.

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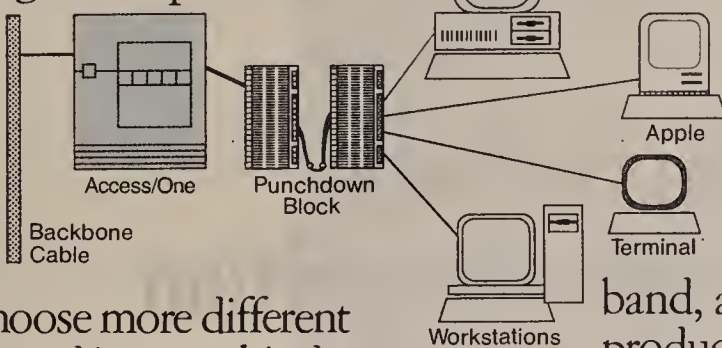
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Not there yet

Unfortunately, we are not quite there yet. Today, competing vendors' systems are far from integrated; they still speak different languages. However, IBM's approach to integration is a sign that the industry is moving in the right direction.

IBM's strategic approach to integration is three-pronged: It includes improved hardware, improved communications and a unified system of architectures. Improved hardware includes continuing developments in storage, main memory, video resolution, voice capability and faster processors. Improved communications includes continuing to develop mature, high-speed local- and wide-area networks.

A unified system of architectures, and its resulting integrated digital data stream, is the glue that binds together developments in the other two areas. IBM's unified system of architectures is called Systems Application Architecture (SAA). The strategic im-

IBM's approach to integration is a sign that the industry is moving in the right direction.

▲▲▲

plications of SAA have been talked about since its introduction. Less has been said, however, about the continuing evolution of its component parts. The component of SAA that is of particular interest for forging integrated workstation applications is Common Communications Support, specifically the different data stream architectures.

There are three basic categories of data stream architecture that specify the format of data. Each has a different purpose, including how to represent the content of a stored document, perform document interchange and communicate between devices on a network.

The primary IBM data stream architectures for these categories are, respectively, Document Content Architecture (DCA), Docu-

(continued on page 44)

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Publication	Percentage-point Increase/Decrease
Network World	34%
TP+T	-1%
Data Communications	-1%
Telephony	-2%
Teleconnect	-3%
Telecommunications	-3%
Communications Week	-8%
Communications News	-9%

Source: *The Wall Street Journal* Telecommunications Study by Erdos and Morgan, March 1986 and March 1988.

TWO

Most Helpful Publication

Then the 1988 Telecommunications Association Member Study revealed *Network World* to be the Most Helpful publication for giving managers and users the kind of news and information they need every day.

Publication	Preference
Network World	30%
Communications Week	25%
Business Communications Review	20%
Communications News	15%
Data Communications	15%
Teleconnect	15%
Telecommunications	10%
Telephony	10%

Source: 1988 Telecommunications Association Member Study.

THREE

Largest Growth in Ad Pages

And the December 1988 TA Report showed *Network World* leading all other networking/communications publications in ad-page growth. In fact, *Network World's* growth for the comparative periods exceeded that of its nearest competitor by 63%!

Publication	Ad-Page Growth
Network World	64%
Data Communications	1%
Communications Week	-5%
TEM	-12%
Telephony	-20%
Telecommunications	-20%

Source: December 1988 TA Report. Comparative growth in advertising pages for the period from January-December 1988 versus January-December 1987.

Network World delivers your advertising message to an audience of over 70,000 ABC audited buyers — who each plan to spend an average of \$2.5 million on networking/communications products and services in the next 12 months. So when you're planning your strategy for reaching buyers, go for a sweep — and turn to *Network World*. Call Paul McPherson, Director of Advertising, at (508) 820-2543 to reserve your space today!

All together now

continued from page 41

ment Interchange Architecture (DIA) and Systems Network Architecture.

All of these architectures provide a standard for developing communications software that will allow different types of com-

puter systems in a network to share information. In general, document content architectures are the fundamental integrating mechanisms. They allow software to describe the format and meaning of the content of a document to be interchanged in a network.

A new generation

A mixed-object architecture can be thought of as a next-generation document content architecture.

This provides a common language for documents and their many objects so that they can be interpreted on any system.

A mixed-object architecture provides the integrating framework necessary to intermingle and interchange freely the various types of information within

mixed-object architecture means change — change in the sense that any mixed-object architecture standard that emerges must be different from all of the current document content architectures yet similar to them all.

Therefore, conversion programs, called transforms, are needed to move mixed-object documents into a mixed-object architecture product. These programs are an interim solution that will not be necessary once software firms build mixed-object architecture into their products from the ground up, instead of adding the capability to existing products.

Mixed-object architecture by itself specifies only part of the architecture necessary to define a complete data stream. A set of specialized object content architectures completes the picture. Each of these object content architectures is defined by a base set of functions — for example, the functions for a text object — from which different implementations can be drawn.

In the past, document content architectures combined the functions of mixed-object architectures and object content architectures for each single object type. In the future, if standards are agreed upon, multiple document content architectures will be

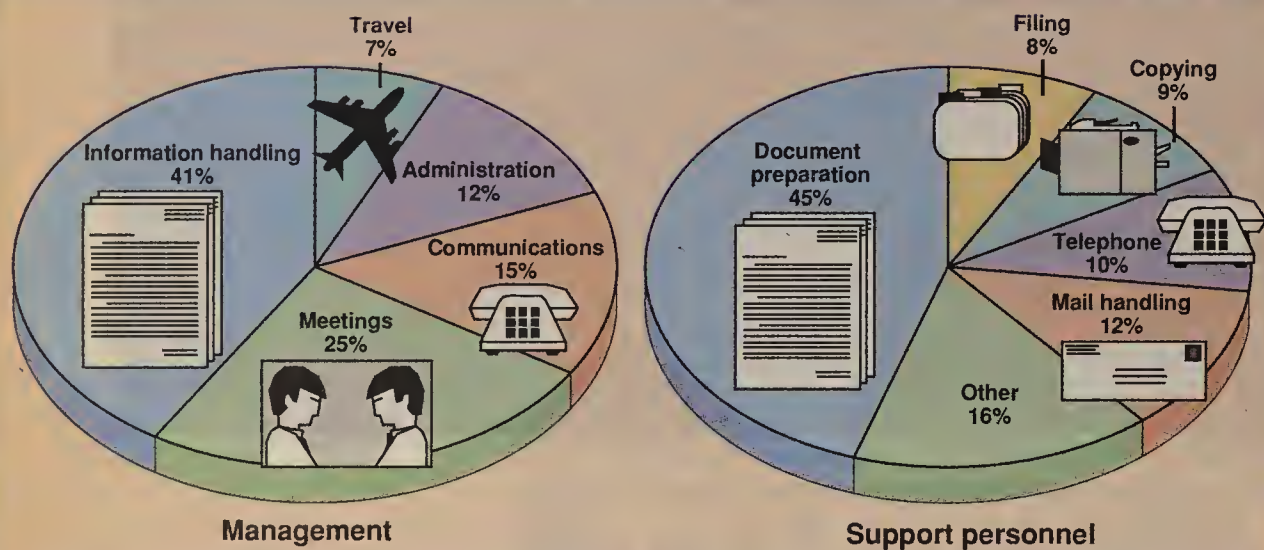
change Architecture — also known by analysts as Mixed Object Document Content Architecture — is a sign that vendors are making progress in this crucial area of data stream architecture. However, IBM has released little detail on the architecture and has yet to announce products that support it. Subsets of the new specification are implemented in some existing IBM office system products, such as the Displaywrite word processor family.

Digital Equipment Corp.'s more public release and aggressive commitment to its Compound Document Architecture is another strong endorsement of the mixed-object architecture concept (see "Apples and oranges, text and graphics," page 29). In fact, the fear is that the endorsements will be in place from most of the major vendors, each for its own approach, well before a completed common international specification for Office Document Architecture is available from the International Standards Organization.

Yet, the signs are strong that mixed-object architecture — a previously overlooked but vastly important ingredient for the integrated workstation — is gaining recognition as a catalyst for the development of multimedia applications.

Support/management time comparison

Figure 1



GRAPHIC BY SUSAN SLATER

SOURCE: ARTHUR ANDERSEN & CO., CHICAGO

puter systems in a network to share information. In general, document content architectures are the fundamental integrating mechanisms. They allow software to describe the format and meaning of the content of a document to be interchanged in a network.

DCA is strictly concerned with format rather than process. The other architectures are wrapped around the DCA-formatted document (see Figure 2, this page). DCA does not dictate in any way how the document is to get from one place to another, to whom it is to go and so on. For SAA, "process" is the duty of DIA and SNA Distribution Services (SNADS).

The goal of DCA is to provide a way of representing a document in a standard format so all programs that may be called on to manipulate it can understand it. For example, a word processing program that uses a standard document content architecture is

ation document content architecture. It takes into account that each object type has unique characteristics determining its format and its potential to be interchanged as part of a document. Until recently, text has been the only object for which vendors have largely adopted a standard document content architecture, IBM's DCA.

Another way of dealing with different objects such as voice or video is to develop other document content architectures for them. However, a proliferation of architectures decreases the opportunity for minimizing the number of standard formats and doesn't completely address the problem of how to integrate the objects to facilitate interchange.

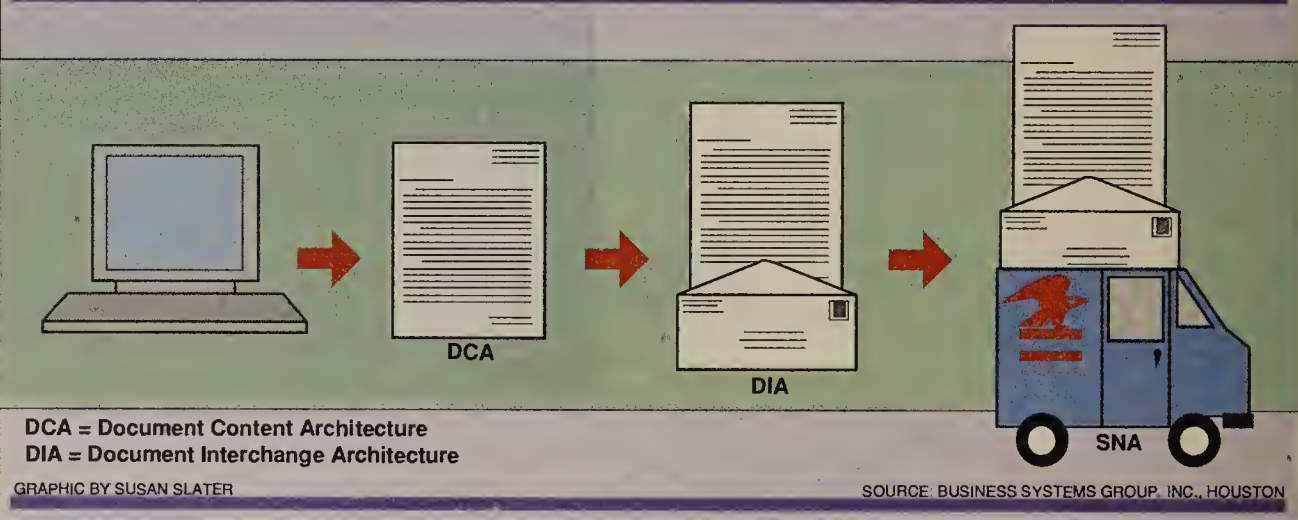
A standard mixed-object architecture is the complete solution to this interchange problem. A mixed-object architecture can be fashioned from the strengths of the existing document content

an organization.

From a strategic viewpoint, mixed-object architecture provides an important link in the plan to bring together the many

How IBM data stream architectures work together

Figure 2

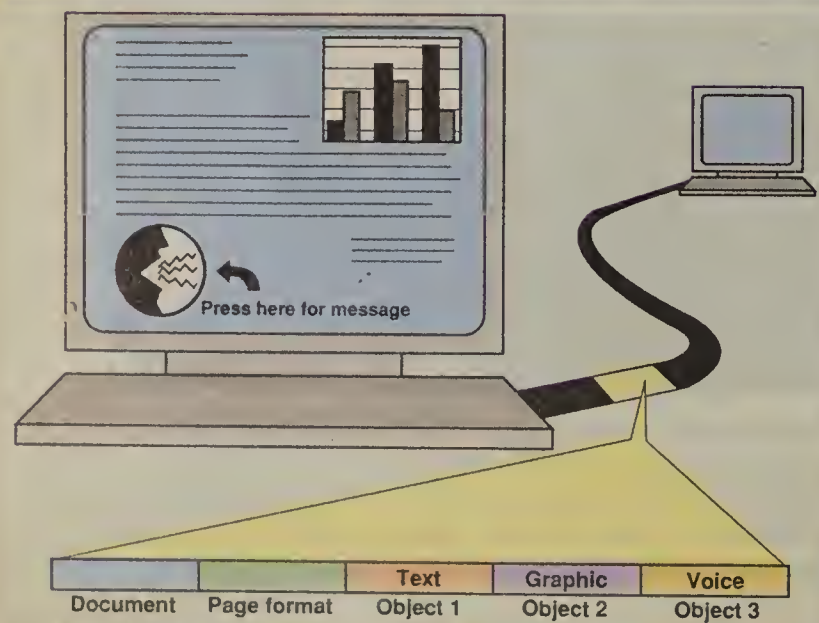


GRAPHIC BY SUSAN SLATER

SOURCE: BUSINESS SYSTEMS GROUP, INC., HOUSTON

Building the data stream from a multi-object application

Figure 3



GRAPHIC BY SUSAN SLATER

SOURCE: BUSINESS SYSTEMS GROUP, INC., HOUSTON

resources of an organization to the integrated desktop workstation. A single, revisable data stream can contain the output from an application combining several different objects — graphics, text and voice (see Figure 3, this page).

From a practical perspective,

phased out in favor of a single mixed-object architecture and a variety of object content architectures.

Signs of progress

IBM's disclosure last year of its mixed-object architecture specification, called Office Inter-

Without mixed-object architecture, vendors will continue along proprietary paths, preventing the creation of information that transparently spans organizations. With it, they will be able to deliver business applications with the performance and integration that users need. ■

Letters

continued from page 25

tomers with the means of controlling — and perhaps eliminating — the constant barrage of unwanted, unsolicited and ill-timed phone calls from vinyl siding, magazine and shopping service "telemarketers" that so many of us are forced to endure daily.

I believe that such calls constitute an invasion of privacy far more severe than that arising when, for example, the pizza delivery place, which *you* called, knows who you are by your

phone number. In this regard, ANI (at reasonable rates) would be welcomed by the residential telephone-using community.

I imagine there would be a very good market for call-screening devices or telephone company-provided services that would pass "friendly" calls (for example, from friends and family) directly to your telephone while directing all others to an answering machine or voice mail or, in certain cases, to nowhere — the bit bucket, if you will. Used in this way, ANI might bring about the end of harassing, obscene or just

plain unwanted calls.

In my opinion, the ANI/unlisted number issue is fairly trivial. I seriously doubt that the protection of unlisted numbers is beyond the technical capabilities of the service providers.

If, on the other hand, it turns out that the protocols used simply cannot contend with this issue, then that is the fault of the designers/implementors and not the rate-paying customer.

Chuck Scanland
Senior systems engineer
Digital Equipment Corp.
Marlborough, Mass.

Apples, oranges, text and graphics

continued from page 40

dition, work is in progress on color graphics and tiling, an alternative way to transmit images by breaking them into a grid and sending them one piece at a time.

"We also plan to incorporate equation content architecture so users will be able to interchange mathematical information in a more natural way," Wedel says. "Our goal with ODA is to have interchangeable compound documents using [File Transfer, Access and Management] and the X.400 message-oriented text interchange system."

ODA defines the logical and layout structure of a document, although it doesn't yet fully describe logical objects and related semantics. Its interchange specification, ODIF, conforms to ASN.1. ODA also supplies an Office Document Language that complies with SGML.

"ODIF puts Office Document Architecture into a form that can be transmitted over communications lines," Soft-Switch's Zisman says. "It flattens it out so you can push character by character."

Although other architectures will likely continue to outpace ODA in the area of fea-

Although IBM hasn't publicly provided much information about its developing compound document architecture, it is well on its way. IBM is expected to expand DCA to include mixed objects. The specifications for MODCA have not been publicly released, however.

According to Milliken of Patricia Seybold Office Computing Group, MODCA will be the envelope that holds a variety of object architectures. Currently, MODCA is expected to support text, image, graphics and data. Voice will most likely be supported at some later date. Consultants expect IBM to define MODCA by the end of this year.

While IBM has not publicly announced support for ODA, it will most likely do so in the future. "IBM is migrating toward OSI, but IBM has a different approach," Omnicom's Christie says. "IBM is probably plan-

ning more of a gateway-type compatibility from its system-level architecture."

The future

Compound document architectures will pave the way toward the use of all kinds of hypermedia systems. Compound document standards will also make hypertext systems more feasible.

Examples of such systems are Brown University's Intermedia, an interactive teaching tool; the Microelectronics and Computer Technology Corp.'s Graphical Issue-based Information System; and Xerox Corp.'s Palo Alto Research Center's Notecards, an information analysis tool.

While hypertext systems are commonly described as multimedia data bases or cooperative work environments, it will be their ability to combine various forms of

information such as text, graphics and image across proprietary system and software barriers that will make them feasible.

By actively promoting CDA, DEC hopes to make compound documents feasible for all users. Perhaps DEC also wishes to create the de facto industry standard in this area. The company has taken the risky role of first adapter to try to garner the support of application developers.

"If you consider the length and breadth of the application base that CDA might fit, you'll see that [the impact of compound documents] could be enormous," says Terry Shannon, director of the DEC Advisory Service at Framingham, Mass.-based International Data Corp. "And if DEC didn't think so, I don't think they would have invested the time and money they have in CDA." □

By actively promoting CDA, DEC hopes to make compound documents feasible for all users. It may also wish to create the de facto industry standard in this area.

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tures, ODA will remain important to all other architectures because it will be a standardized X.400 body type.

Other architectures

Wang's WITA is still evolving; it's not as functionally complete as CDA. WITA was developed internally as a mechanism for transferring Wang word processing files across dissimilar systems.

Currently, WITA provides document-transfer capability between a variety of systems by translating document information into a WITA data stream and then converting that data stream into a suitable format for the recipient application.

WITA data stream formats consist of segments, which define the information that they package; descriptors, which describe data stream elements; attributes, which provide additional segment content information; and controls, which specify special conditions.

Wang's Office Document Model complements WITA by providing specifics concerning data stream contents such as text, administrative information, graphics, storage and reference material. Additional WITA support options include three content data types: image, graphics and text. Dynamic tabular data interchange is not supported yet.

Wang doesn't currently support ODA but plans to support it in the future.

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Health care company uses AS/400 as net keystone

Firm distributes applications using IBM's APPC.

By Paul Desmond
Staff Writer

BOSTON — The Kendall Co. has abandoned a hierarchical mainframe network in favor of a distributed network of minicomputers that handle local processing needs and communicate with one another using IBM's Advanced Program-to-Program Communications.

Kendall, based here, is installing IBM Application System/400 (AS/400) processors at each of its sites to run manufacturing, production and development applications locally. The company currently has a mix of AS/400s, System/36s and System/38s.

Using APPC, which allows data to pass from any network node to any other, the processors can exchange information with minicomputers supporting corporate applications, as well as with other Kendall minicomputers throughout the country.

Communications will become even easier once the \$1.1 billion health care product manufacturer completes its planned migration to IBM's Advanced Peer-to-Peer Networking (APPN). APPN offers the company dynamic route selection and eliminates the need for users to develop and maintain complex routing tables showing how information should be transmitted, said James Stanley, a network communications/systems specialist who specializes in software for Kendall.

Moving to a distributed processing environment promises to cut operation costs by \$2.5 million annually, said Robert Ra-

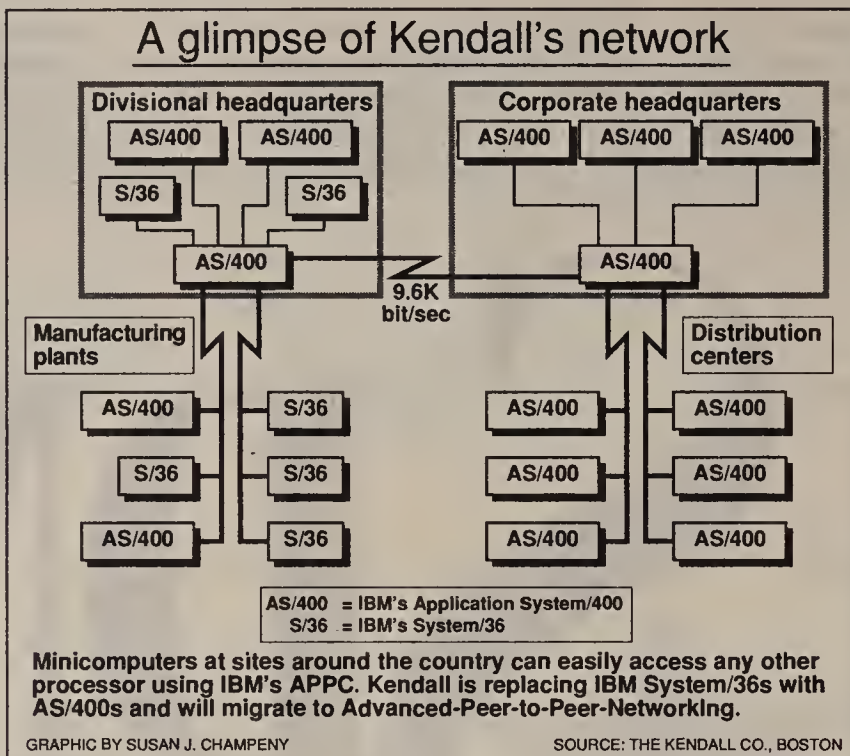
viniski, a network communications/systems specialist with Kendall's technical services department.

Kendall installed a System/38 to act as the communications hub

from Colgate. The company then embarked on the distributed processing plan, which was originally based on the System/36s already in place.

Any-to-any

APPC simplifies communications among network nodes. "Any location can talk to any location using a single log-on menu," Ravinski said. "[Users can] select any site on the network and pass through directly to it."



for its network, but only as an interim measure until IBM began shipping the AS/400, Ravinski said.

Kendall's network supports three main divisions, including one that the company recently sold off but agreed to support for a year. AS/400s and System/36s support individual departments within a division, such as manufacturing, production or development, and they are linked to a single AS/400 at the division headquarters (see graphic, this page).

That feature is key to network support personnel such as Ravinski because they no longer have to make their 5250 terminals emulate a 3270 in order to establish communications with a mainframe and then log on to a remote minicomputer.

Now, from Boston, Ravinski can log on to an AS/400 located anywhere in the country to perform such support functions as software upgrades, line configurations or workstation additions.

No special communications software is required for APPC support since it is built into OS/400, the operating system of the AS/400, Stanley said. However, users must define each data route between nodes.

That will no longer be the case once the company finishes replacing its remaining System/36s with AS/400s later this year and begins the conversion from APPC to APPN, Stanley said. That move should improve response time and give the company more flexibility in network configurations, he said.

Under APPN, each network node is aware of its location in relation to all other nodes and quickly learns about any changes in the network. The nodes use that information to find the best route to transmit data, relieving the user of the task of defining each route, he said.

"As far as going to an adjacent node, APPC is relatively easy to implement," Stanley said. "But when you start adding other locations via intermediary nodes, it becomes more complex, and that's when you would want to start implementing APPN." □

Wang adds gateways, net interface

By Wayne Eckerson
Staff Writer

LOWELL, Mass. — Wang Laboratories, Inc. last week unveiled gateways that link Ethernet and token-ring local networks running Wang office automation software.

In addition, Wang announced an interface for its Freestyle computer system that allows Freestyle users to send documents to remote local networks using Wang's LAN Office software.

One of the two new local net gateways, the LAN Office InterLAN gateway, is software that allows personal computer users running LAN Office software on Banyan Systems, Inc. VINES, Novell, Inc.'s Advanced NetWare, IBM's PC LAN, and 3Com Corp.'s 3+ Share and 3+ Open local networks to communicate directly with one another. Previously, users on those nets had to route electronic mail and files through Wang's VS Office minicomputer network.

LAN Office software allows local network users to send E-mail, schedules, phone lists and DOS documents such as spreadsheets, word processing files and data base files to other LAN Office users on the same network.

LAN Office software and the LAN Office InterLAN gateway sit on a Wang 200/300 series personal computer on a local net. This computer, which is a gateway server on the network, supports a full-duplex Wang Telemodem or Hayes Microcomputer Products, Inc.-compatible modem, communications software for both local (less than 2,000 feet) and remote (more than 2,000 feet) network connections and software running the local network.

Office assistant

Wang's new LAN Office VS Gateway is server software that allows LAN Office users to communicate with VS Office users on remote minicomputer networks.

Codex expects opportunities

continued from page 10

Product distribution should also become easier in 1992, he added, allowing Codex to spend less money on maintaining separate inventories.

"Today, we typically keep inventories on a country-by-country basis," Wright said. After 1992, Codex plans to centralize its inventories and transport products as needed between countries.

Although relaxed trade restrictions may facilitate Europe-

Previously, LAN Office and VS Office users could exchange documents only when their networks were located less than 2,000 feet away. The new gateway allows LAN Office users and VS Office users to communicate across wide-area networks.

The gateway allows LAN Office users to exchange mail with X.400 and public E-mail networks, as well as with other vendors' E-mail systems, including IBM's Professional Office System and Distributed Office Support System, and Digital Equipment Corp.'s All-In-1, that are tied into VS Office.

The gateways have synchronized directories and simplified addressing capabilities. Simplified addressing enables users to type the recipient's name to send mail across networks, instead of having to key in lengthy VS Office destination codes. Synchronized

The gateways have synchronized directories and simplified addressing capabilities.

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directories automatically update user addresses when changes are made in either a local network or a VS Office directory.

Freestyle interface

The Freestyle-LAN Office Interface is software that links Freestyle documents into LAN Office for distribution to other networks.

The Freestyle system consists of a personal computer, electronic pad and pencil, and telephone that allow users to add handwritten, typed and voice comments to digital documents.

The Freestyle system also supports separate interfaces to VS Office and Group III facsimile.

The InterLAN and VS Gateways cost \$995 per server license and will be available in the second quarter of 1989. The Freestyle-LAN Office Interface is priced at \$100 and will be available in the third quarter of 1989. □

an trade for Codex, Wright is cautious not to overlook the fact that increased competition will also likely result. "With certain trade barriers gone in Europe," he said, "smaller competitors will be able to enter the market. Therefore, Codex must take steps to increase its competitiveness."

To better address the new European market, Codex will be working to fine-tune its image over the next three years, Wright said. "Today, we're very much focused on individual markets. We're looking now at developing a more pan-European image."

— Gail Runnoe

"You're eliminating your major net mainframe, with that huge amount of staff and overhead."

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viniski, a network communications/systems specialist with Kendall's technical services department.

"You're eliminating your major network mainframe, with that huge amount of staff and overhead," Ravinski said.

Two years ago, when Kendall was a subsidiary of Colgate-Palmolive Co., the company used its parent's IBM 3080 mainframes for application processing. Terminal users accessed the mainframes through attached System/36s.

New approach

In 1987, a group of Kendall managers, with the backing of the investment company Clayton & Dubilier, Inc., bought Kendall

The AS/400 at each division headquarters is linked to a central AS/400 at Kendall headquarters here. Its sole function is to route data to corporate processors within headquarters, to one of five product distribution centers or to other division headquarters.

Remote sites are linked to division headquarters by dedicated 9.6K bit/sec lines. Similarly, division headquarters and distribution centers are linked to the Boston hub via 9.6K bit/sec lines. All dedicated lines are backed up by dial-up links, Ravinski said.

Each division handles its own internal processing and forwards corporate financial, payroll and other information to Boston, where it is processed on a dedi-

EDS weighs installation of SS7

continued from page 2

EDS began exploring the idea of implementing SS7 in the GM network in October 1988, concluding the work about one month later, but it is scheduled to reevaluate the advanced networking project this summer.

"SS7 is a great technology, but we have to determine where it fits in the net, how to best implement it and how to justify it," said TC Molloy, a manager with CSD.

The SS7 net would off-load the signaling information required to set up calls from the traffic-bearing network and would support advanced services such as Integrated Services Digital Network. Both EDS and its customers stand to gain from experience with SS7, according to analysts.

"EDS can use SS7 experience to make itself a major provider of advanced international voice and data networks," said Joaquin Gonzalez, vice-president of consulting and business development for The ARIES Group•MPSG, a consulting firm in Rockville, Md.

"They could apply what they might learn about SS7 to custom-

ers with large corporate networks, which will eventually have to interface with SS7 networks," Gonzalez added.

EDS said it began exploring the possibility of using SS7 in the GM net with the goal of cutting costs and increasing network efficiency.

SS7, for example, could cut call setup and teardown time from 30 seconds to fewer than 10 seconds, according to EDS' Molloy. He would not say how long it takes to set up a call between two points on an EDS T-3 link.

Molloy said, however, that EDS could achieve certain efficiencies using SS7 on its Warren, Mich.-to-Plano, Texas, fiber link, which can support 672 circuits but is only used to carry about 500 circuits.

"By using SS7, we estimated we would only need about 420 of these circuits for [voice and data] traffic," Molloy said. A separate pair of circuits would be needed to carry signaling information over the SS7 network between the two switches, he added.

EDS already owns 53 T-3

lines, most of which are interstate links. The extra capacity could be used to handle traffic increases or to support new applications. Although it promises much, the cost of implementing SS7 on GM's six-site T-3 backbone would be high: EDS estimated it would cost \$600,000 to \$1 million to upgrade each of a handful of network switches to support SS7.

The switches — Northern Telecom, Inc. SL-100 private branch exchanges and digital central office switches — are located in Atlanta, Chicago, Detroit, Edison, N.J., Plano and Warren.

When EDS first discussed using SS7 in the GM network, the necessary switch software was not complete. It is only now being beta-tested and may not be commercially available until later this year. EDS is pressing Northern Telecom to make the software available sooner.

EDS said it would also need to acquire the signal transfer points and signal control points that make up an SS7 network, as well as buy a small number of lines to interconnect the hardware to the net switches. □

Apple shows token-ring link

continued from page 1

and would only say that token-ring products were coming.

"Reports of its imminent availability have been greatly exaggerated in the past, but I think it's for real this time," said a source who requested anonymity.

TokenTalk is based on Texas Instruments, Inc.'s 4M bit/sec token-ring chipset, which TI developed with IBM. Use of the chip should ensure interoperability between Apple's token-ring interface and IBM's Token-Ring Network products.

TokenTalk reportedly includes 512K bytes of memory that is expandable to 2M bytes, much more memory than other token-ring interfaces that serve single workstations. The interface also has a Motorola Corp. 68000 microprocessor, the role of which is still unclear. Analysts said the chip could be used to perform the conversion needed to link the two types of networks.

TokenTalk will be priced at \$1,200, according to one source.

News of the board was welcomed by analysts. "Apple had to come out with a token-ring board if it wanted to achieve any type of network presence within IBM accounts," said Joaquin Gonzalez, vice-president of consulting and business development at The ARIES Group•MPSG, a consulting firm in Rockville, Md.

TokenTalk has become imperative to user efforts to integrate the Macintosh into mainstream corporate networks, especially as users shift their local network preference to token-ring technol-

ogy, analysts said.

Several market studies indicate that the token ring, which did not exist when the Macintosh debuted in 1984, will pass Ethernet as the market leader before the end of the year. Apple supports direct Ethernet interfaces through an OEM agreement with 3Com Corp., and it has needed an interface to satisfy the growing ranks of token-ring users.

Some Macintosh supporters said they were surprised by the gateway approach Apple has taken with TokenTalk. Those sup-

Apple may have opted for the gateway approach to protect its AppleTalk product line.

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porters said they had expected Apple instead to serve up an interface board for individual Macintoshes, just as other vendors supply token-ring interfaces for individual personal computers.

Observers said Apple may have opted for the gateway approach to protect its AppleTalk local net product line. If Apple had instead opted to offer interfaces for each Macintosh, users could dump Apple's slow network for direct attachments to token-ring nets.

"They're going with a gateway board to amortize the cost of the connection over the clusters of existing Macs and to retain ownership of the network behind the

gateway," Gonzalez said.

The gateway approach reduces the connection cost per device, depending on how many systems are linked via the token-ring gateway, said Richard Villars, local net analyst at International Data Corp., a market analysis firm in Framingham, Mass.

However, Villars warned, there could be performance degradations with the gateway approach. As users add Macintoshes onto the gateway, he said, the TokenTalk board will reach a point when it cannot buffer additional data. Consequently, Macintoshes could be forced to wait for access to the gateway.

Apple's plan to offer a gateway and not a workstation interface could have been prompted by its goal to provide immediate token-ring access for its current installed base of 1.5 million users on 258,000 AppleTalk and Ethernet networks, Villars said.

"From a pricing standpoint, it's ludicrous to think that AppleTalk users would replace their nets with token ring," he said.

Although Apple chose to offer a gateway token-ring interface, other third-party suppliers are expected to announce workstation token-ring interfaces for the Macintosh soon.

Macintosh connectivity pioneer Kinetics, Inc. — which, along with its parent company Excelan, Inc., is being acquired by Novell, Inc. — is said to be developing a token-ring board. Kinetics declined to comment on any Macintosh token-ring plans, but sources said Kinetics will announce its product within 30 days. □

Senior Editor Laura DiDio contributed to this story.

GM migrates to SDN in net optimization plan

WASHINGTON, D.C. — In an effort to optimize General Motors Corp.'s private voice network for cost, GM subsidiary Electronic Data Systems Corp. (EDS) is migrating as many as 200 GM offices to a virtual network service.

The redesign, outlined for 150 users at the second annual T-1 Users Conference and Expo 1989 here last week, will cut GM's calling costs from .18 cents per minute to less than .13 cents per minute, according to EDS officials.

GM bought EDS in 1984 and gave the company the charge of revamping the automaker's voice and data network. EDS accomplished this feat, for the most part, using its own dedicated network.

The economies of virtual nets, however, convinced the company to migrate some of these GM locations to AT&T's Software-Defined Network (SDN) service.

"We are confident we can maintain the same high quality of service and offer the same functions and features [employees] already have while substantially cutting communications costs," said TC Molloy, a manager with EDS' Communication Services Division.

GM is expected to become one of AT&T's largest SDN users once it completes loading roughly 10 million minutes of traffic per month onto the virtual network service.

In fact, the GM traffic is expected to be so substantial that EDS convinced AT&T to increase the high-end volume dis-

count for the service, EDS said. AT&T will file a tariff change with the Federal Communications Commission for the new discount in coming weeks.

The bulk of the planned SDN sites are located in the western and southeastern portions of the U.S. These sites were formerly linked to the GM T-1 backbone network with private lines.

Revamping the net

Just four years ago, EDS began replacing 15 Enhanced Private-Switched Communication Service switches, three Common Control Switching Arrangement switches and nine Electronic Tandem Network switches with 38 EDS-owned and three leased tandem switches.

Roughly 1,200 GM locations were migrated from the old network to the new dedicated network. By April of last year, EDS had disconnected 15,000 old network circuits and installed the equivalent of 18,000 circuits within high-capacity digital pipes, Molloy said.

The GM digital voice network carries an average of 35 million minutes of traffic a month, according to Molloy.

Moving GM sites to the SDN will enable EDS to reduce the number of tandem switches from 41 to 34, he said.

EDS has been able to cut the number of intermachine trunks in the network by 40% by changing the type of facilities used to complete off-network calls.

— Bob Wallace

Bureau calls for tariff rejection

continued from page 6

might be asked to include a pricing matrix, which would allow customers to figure discount prices for a particular service based on traffic volume ("FCC continues to ponder destiny of Tariff 12 plan," NW, March 13). An additional discount, based on a customer's total traffic volume, might also be included.

The other modification under consideration would be to rewrite Tariff 12 deals in generic language so that any customer meeting a general traffic-volume requirement could get the same price. Currently, Tariff 12 customers commit to a specific traffic volume and service types at designated locations.

While the legal debate continues over the tariff, the five users whose Tariff 12 deals are under investigation — American Airlines, Inc., American Express Co.,

E.I. du Pont de Nemours & Co., Ford Motor Co. and General Electric Co. — express varying levels of optimism about the outcome of the FCC's meeting.

Stanley Welland, manager of corporate telecommunications at GE, said he believes the tariff will be approved without revisions. The only issue that seems to be troubling the commission is whether Tariff 12 is a generally available offering, he said. If so, any revisions would probably be minor (see "GE Tariff 12 net provides integration," page 1).

"I can't imagine that anything would be revised so terribly that it would terminate our relationship," Welland said.

Paul Tebo, director of telecommunications at Du Pont, said he expects Tariff 12 to be approved — but with some modifications. "We believe there'll probably be some changes, but at this time, our best guess is they're not going to substantially change the way we do business." □

U.S. Companies Involved In ISDN Trials And Service Rollouts

Company	Switch	Access	Carrier	Status	Note
Aetna, Hartford, Conn.	AT&T 5ESS	Basic	Southern New England Telephone	Installation underway	
Alverno College, Milwaukee	Siemens EWSD	Basic	Wisconsin Bell	Started March 1988, ends 1989	Trial.
American Express, Phoenix, Ariz.	AT&T System 85 PBX/4ESS	Primary	AT&T	Started July 1988	First customer of AT&T's Primary Rate.
American Transtech, Jacksonville, Fla.	AT&T System 85 PBX/4ESS	Primary	AT&T	Started Dec. 1987	Beta test site for AT&T's Primary Rate.
Arizona, State of, Phoenix	Northern Telecom DMS-100	Basic	US West Communications	Started Nov. 1986, officially ended	
Boeing Co., Seattle	AT&T 5ESS	Basic	US West Communications	Scheduled start Nov. 1988	
Carnegie Mellon University, Pittsburgh	AT&T 5ESS	Basic		Contract pending	
Chevron Corp., San Francisco	Northern Telecom SL-100/DMS-100	Primary/Basic	Pacific Bell	Installation underway	
Contel Corp., Atlanta	AT&T 5ESS	Basic	Southern Bell	Started April 1988	Paying customer.
Control Data Corp., Minneapolis	NEC NEAX 61E	Basic	US West Communications	Started Nov. 1987, ends Nov. 1988	Trial.
Duke University, Durham, N.C.	AT&T 5ESS	Basic	Southern Bell		
Eastman Kodak Co., Rochester, N.Y.	Northern Telecom SL-100 PBXs	Primary		Started Aug. 1988	First Primary Rate using two SL-100s.
Federal National Mortgage Assoc., Washington	AT&T 5ESS	Basic	C&P Telephone	Started June 1988	
First Data Resources Inc. (American Express subsidiary), Omaha, Neb.	Northern Telecom SL-1 PBX and AT&T 4ESS	Primary	AT&T	Unannounced	
Glaxo Inc., Research Triangle Park, N.C.	SL-1 PBX and DMS-100	Primary/Basic	GTE South	Started June 1988	First Primary Rate/Basic Rate in one trial.
Hardees, Rocky Mount, N.C.	Northern Telecom DMS-100	Basic	Carolina Telephone	Scheduled start Jan. 1989	
Hayes Microcomputer Products Inc., Norcross, Ga.	AT&T 5ESS AT&T 5ESS	Basic Basic	Southern Bell Pacific Bell	Started April 1988 Sept. 1987 to Sept. 1988	Using ISDN to develop ISDN products.
Hershey Foods Corp., Hershey, Pa.	AT&T 5ESS	Basic	Contel of Pennsylvania	Scheduled start Oct. 1988	Will include ISDN satellite transmission.
Honeywell Information Systems (Honeywell Bull), Minneapolis	Northern Telecom DMS-100	Basic	US West Communications	Started Jan. 87, officially ended	Applications included data/voice transmission between office and employees at home.
Intel Corp., Chandler, Ariz.	AT&T 5ESS	Basic	US West Communications	Started Feb. 1987, ended Aug. 1987	Trial.
Johns Hopkins Medical Center, Baltimore	AT&T 5ESS	Basic	C&P of Maryland	Contract pending	
Lawrence Livermore Laboratory (University of California), Livermore, Calif.	AT&T 5ESS	Basic	AT&T Federal Systems		
Lockheed Missiles and Space Co. Inc., Sunnyvale, Calif.	AT&T 5ESS	Basic	Pacific Bell	Started Sept. 1987, ended Sept. 1988	Trial.
Mass. Institute of Tech., Cambridge	AT&T 5ESS	Basic		Scheduled cutover Oct. 1988	Using AT&T 5ESS as PBX for private network.
Mather Air Force Base, Sacramento, Ca.	AT&T 5ESS	Basic	AT&T Federal Systems	Started Aug. 1988	Model for ISDN deployment at 50 bases.
McDonald's Corp., Oakbrook, Ill.	AT&T 5ESS	Basic	Illinois Bell	Started Dec. 1986	
McDonnell Douglas Corp., St. Louis		Primary	AT&T	Unannounced	
Microcom Inc., Norwood, Mass.		Basic	New England Telephone	Installation underway	Part of centrex contract.
Motorola Inc., Schaumburg, Ill.	Northern Telecom DMS-100	Basic	Illinois Bell	Planning stage	
NASA, Washington	AT&T 5ESS	Basic	AT&T Federal Systems		
Nice Corp., Ogden, Utah.	Northern Telecom SL-1s	Primary			Telemarketing company using private ISDN.
North Carolina State Univ., Raleigh	Northern Telecom DMS-100	Basic	Southern Bell		
Northeast Utilities, Hartford, Ct.	Northern Telecom SL-1s	Primary			PBXs in Rocky Hill Ct. and Meriden, Ct.
Pennsylvania, State of, Harrisburg	Northern Telecom DMS-100	Basic	Bell of Pennsylvania	Contract pending	Statewide network with ISDN in Harrisburg.
Pratt & Whitney, East Hartford, Conn.	AT&T 5ESS	Basic	SNET		
Prime Computer Inc., Natick, Mass.	AT&T 5ESS	Basic	Southern Bell	Started April 1988	Paying customer.
Rockwell Communication Systems, Richardson, Texas.	AT&T 5ESS with two remotes.	Basic	Southwestern Bell	Scheduled start Dec. 1988	40 buildings in a campus environment will be linked via ISDN.
Shearson Lehman Hutton Inc., New York	AT&T 5ESS	Basic	New York Telephone	Started June 1988	Part of 8,000 line centrex contract.
Shell Oil Co., Houston	AT&T 5ESS	Basic	Southwestern Bell	Start Sept. 1988	Plan to use 5,000 ISDN lines.
Southern Methodist University, Dallas	Siemens EWSD	Basic	Southwestern Bell	Started Feb. 1988	
SunTrust Service Corp., Atlanta	AT&T 5ESS	Basic	Southern Bell	Started April 1988	Paying customer.
3M Corp., St. Paul, Minn.	AT&T 5ESS	Basic	Southwestern Bell	Started Aug. 1988	Plan to use 3,165 ISDN lines.
Tenneco Inc., Houston	AT&T 5ESS	Basic	Southwestern Bell	Started June 1988	Plan to use 3,900 ISDN lines.
Texas A&M University, College Station	GTE GTD-5 EAX	Basic	GTE Southwest		
University of Arizona, Tucson	AT&T 5ESS	Basic	US West Information Systems Inc.	Planning stage	Using AT&T 5ESS as PBX in private network.
University of Connecticut, Storrs	AT&T 5ESS	Basic	SNET		
University of Indiana, Bloomington	Northern Telecom DMS-100	Basic	Indiana Bell		
University of Maryland, College Park				Unannounced	
University of South Florida, Tampa	AT&T 5ESS		GTE South	Started Oct. 1987	
U.S. Dept. of Treasury, Wash.				Contract pending	
U.S. Bank of Oregon, Portland	Northern Telecom DMS-100	Basic	US West Communications	Started March 1987	Trial.
Virginia, State of, Richmond	AT&T 5ESS	Basic	C&P of Virginia	Started April 1988	
West Virginia University, Morgantown	AT&T 5ESS	Basic	C&P of West Virginia	Scheduled start Dec. 1988	Plan to use 660 ISDN lines.

Note: This chart was compiled by *CommunicationsWeek* with information provided by Teles Communications Inc., Eatontown, N.J., as well as from news releases and published reports. Carriers, switch manufacturers and their affiliated laboratories are not listed.

The ISDN Scorecard.

As the demand for ISDN grows, so does the number of ISDN suppliers eager to take credit.

But, as you can see by this CommunicationsWeek chart, there is one clear-cut ISDN leader—the company that helped build the standards for ISDN. That company is AT&T.

95% of ISDN lines are on an AT&T 5ESS® switch.

AT&T Network Systems has helped more local telephone companies install more ISDN lines than any other telecommunications supplier—95% of non-trial ISDN lines. What's more, we've already shipped over 200,000 ISDN lines for future use. Today, 99 central offices can offer operational ISDN services over the AT&T 5ESS switch, with a total of 415 upgraded with ISDN software.

So, while other suppliers are still in product development trials, AT&T Network Systems is helping phone companies across the nation offer ISDN services right now on today's network. Services such as simultaneous voice and data transmission, high-speed facsimile and electronic mail all over a single phone line.

ISDN is just the beginning.

We believe that ISDN is the beginning of a bigger future. A future we call Universal Information Services. A future where networks can carry voice, data and image into anyone's office or home at any time in any combination, with maximum convenience and economy.

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AT&T

The right choice.

Delving into the various modules of Apollo's NCS

Too! set benefits net software developers.

Apollo Computer, Inc.'s Network Computing System (NCS) is a set of tools for developing distributed network applications.

Programmers can use NCS to split an application into numerous subroutines, each of which is routed to a specialized processor that is best suited to complete the task at hand.

Application developers can use NCS' three main components to develop networked programs: Remote Procedure Calls (RPC), a Network Interface Definition Language (NIDL) Compiler and a Location Broker.

RPCs are used to develop subroutines that run on various processors in a network, explained Saul Marcus, Apollo's senior product manager of NCS. All programs use subroutines, or procedures, to perform specific tasks.

Programmers use RPCs to identify the parts of an applica-

communications between the workstation client and server.

The Location Broker, a program residing on a processor in the network, brings together the client and server.

When a user executes a program, the workstation application queries the Location Broker, requesting the network addresses of the computers needed for specific RPCs. The subroutines are routed to those processors, where they execute and return the results to the client application automatically.

NCS runs in both Apollo's token-ring network-based Domain environment and IEEE 802.3 Ethernets.

Use of UDP makes NCS independent of higher level protocols so applications on a workstation can talk to other systems, regardless of the transport protocol used.

Limited availability

Today, only a few NCS appli-

Apollo NCS still draws followers

continued from page 1

ers have shied away from the revolutionary technology, choosing to wait for the endorsement of the major industry players, which Apollo now has.

In recent months, IBM, Digital Equipment Corp. and Hewlett-Packard Co. have joined the more than 100 other NCS licensees. With those vendors in the fold, third-party software support can't be far behind, according to Saul Marcus, Apollo's senior

times needed to convert the 2-D drawing to 3-D graphics, a process called nonlinear minimization.

Using NCS' Network Interface Definition Language, company programmers created descriptions of the procedures to be handled remotely, converted them into source code and interfaced them to the local application.

When a researcher executes MolyNCS, the workstation application invokes a Remote Procedure Call. This call goes out over the network to an NCS Location Broker, a program running on

of the vehicle appear on a graphics workstation while the computations driving the image are being processed on a minisupercomputer, according to Ron Stahlberg, senior programming analyst at the center.

The center, which was a test site for NCS, turned to Apollo when it realized that no single computer had both the graphics capability and the horsepower needed by the application, Stahlberg said.

How it all started

When building the applica-

“With IBM, DEC and HP behind NCS, we expect to see an explosion in development.”

▲▲▲

product manager. “We’re starting to see serious interest now; with IBM, DEC and HP behind NCS, we expect to see an explosion in software development,” Marcus said.

Wholly, Moly

Users who did not want to wait have tackled the technology on their own and profited handsomely.

Rohm & Haas used NCS to speed up an existing in-house molecular modeling program, called Moly, used by researchers at its Springhouse, Pa., facility. Moly converts two-dimensional hand-drawn pictures of molecules into moving three-dimensional computer graphics.

When run on a single Apollo workstation, it took Moly up to 60 minutes to crank out a single 3-D image, Pierce said. Recompiling the application to run part of it on an Alliant Computer Systems Corp. minisupercomputer in an NCS environment made Moly (now MolyNCS) 10 times faster.

Pierce used NCS to break down the main application and separate the computational subrou-

one of the eight Apollo workstations. The broker matches the call from the local application, the client, with the appropriate subroutine on the Alliant minisupercomputer, the server.

As the Alliant minisupercomputer completes the computations, it transmits the results back to the workstation application. The engineer sees each portion of the 2-D drawing transform into a 3-D image.

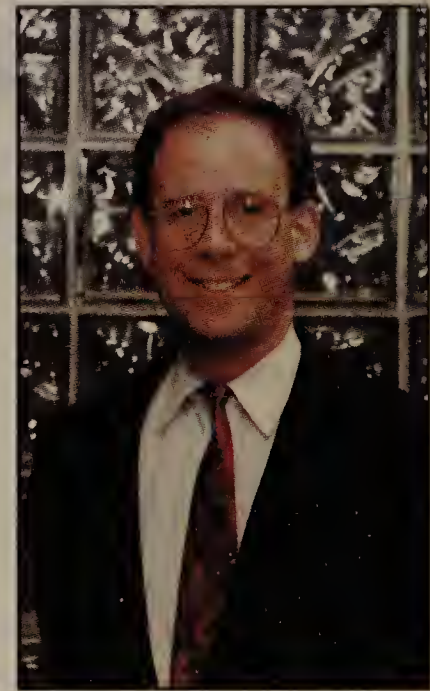
On average, the application today now processes the model in one to three minutes, Pierce said.

Design of the times

NCS has also been well-received at the Center for Simulation and Design Optimization, a cooperative research center at the University of Iowa in Iowa City.

Programmers there used NCS to write an interactive simulation program, which it uses to support a simulation and design service offered to outside clients.

The NCS application is currently being used to stress-test a prototype vehicle for a government agency. The moving images

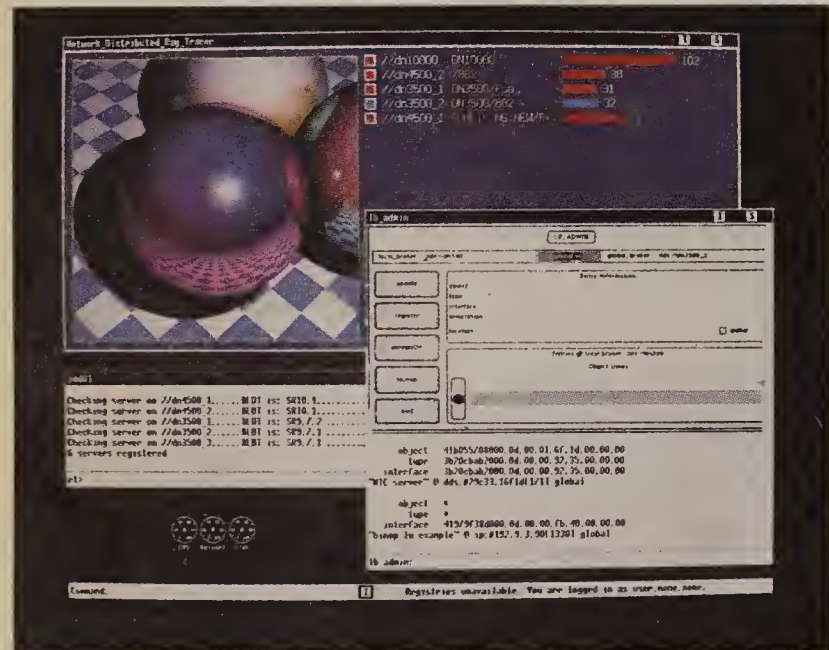


Apollo's Saul Marcus

tion, a team of programmers wrote the simulation program while another programmer went to work with the NCS tools. The programmers separated the subroutines from the original program and placed them on an Alliant minisupercomputer.

The subroutines handle the computations that create the simulation, and the rest of the application runs on either Apollo or Silicon Graphics, Inc. workstations. The workstations display the moving image while engineers use a mouse to interactively change variables, such as the vehicle's speed or steering angle. They can then see the results almost instantly.

NCS frees users from having to



The interface on a Network Computing System application lets the user view the application (left) and the server status.

tion that are best suited to run on remote processors. They then use NIDL to define interfaces, called stubs, between the local application (the client) and the remote procedures that run on the server.

The NIDL Compiler converts the stubs and subroutines into C language source code so they can be loaded on the local and remote processors.

The stubs on the local application can communicate with stubs on remote systems, regardless of the protocols that those systems support. This is possible because NCS uses the User Datagram Protocol (UDP), a low-level data service in the Transmission Control Protocol/Internet Protocol.

The NCS RPC environment uses the Berkeley Unix socket concept for interprocess com-

munications are available, most of them Apollo's own. One is Knowledge Broker, an information-retrieval program that locates, collects and displays published on-line information about a topic from different sources on a network.

OmniBack Network Backup System, another Apollo NCS application, supports automatic, unattended file system backups and simple file-restoration operations for systems throughout a network.

Perhaps Apollo's best-known NCS product is its Network License Server, which enables a fixed number of users to access an application concurrently from any system on a network. The product brings the concept of site licensing to a computer network.

— John Cox

FCC ruling to open options

continued from page 1

in dialing 800 numbers would not be tolerated by customers, particularly companies using 800 numbers for credit card verification.

Nine seconds would probably exceed the preprogrammed time limit that credit card verification devices will wait for a connection, said Gerald Brock, chief of the FCC Common Carrier Bureau. Companies operating those devices would have to bear the expense of reprogramming them to accept the longer delay.

To ease the problems created by long call-setup delays, the FCC order last week mandated that the RBHCs cannot change their current method of routing 800 calls until they have implemented

CCS7 at all of their tandem switch sites and until 80% of the nation's traffic originates at central offices with CCS7 capabilities.

A particular problem

Routing 800 calls presents a particular problem because the RBHCs must route the call to the carrier specified by the call recipient, not the caller. This is currently done by assigning the first three digits of the seven-digit number trailing the 800, referred to as an NXX code, to a particular 800 interexchange carrier.

The RBHCs maintain records that detail which 800 NXX codes correspond to which interexchange carriers. Since the 800 number codes are assigned to specific carriers, users must change their 800 numbers if they want to change carriers.

With 800 data bases, the RBHCs could maintain information matching any 800 number with any carrier, meaning 800 numbers would be interchangeable. The ability to use the same 800 number with any vendor is critical for companies that have special numbers, such as The Hertz Corp.'s 1-800-CAR-RENT, Brock said.

“Many companies have told us that it would be impossible to change their number, either because it is so well-known and highly-advertised or simply because it is printed on a vast amount of literature,” he said.

Jeff Linder, counsel for the Tele-Communications Association, Inc. (TCA), said TCA supports the FCC ruling because the RBHC 800 data bases will give users more service capabilities. □

find remote resources, log on to them and use their applications, Stahlberg said.

"You can sit at a workstation and [have the NCS application] say, 'I need an array processor to run this,'" he said. "NCS will make those connections for you. It allows you to access a diversity of machines. Given there are some very specialized machines on the market, that's a nice capability to have."

So nice, in fact, Rohm & Haas' Pierce predicts NCS will lead to wide-scale use of networks composed of powerful workstations accessing an array of highly specialized servers for data bases, vector processing and so on. "General-purpose computers are dead," he said. "They're a waste of time. [With NCS,] you can hook special-purpose computers together and have a better environment than you would with general-purpose machines trying to be all things to all people."

Apollo isn't the only vendor pushing network computing; archival Sun Microsystems, Inc. is offering its own Open Network Computing product. However, Apollo is one of the most aggressive promoters of the concept.

One month after launching NCS in February 1987, Apollo formed the Network Computing Forum, an independent consortium currently composed of more than 100 corporations and universities pledged to developing practical network computing applications and products. ■

GE net provides integration

continued from page 1

300 T-1 links. About 70% to 80% of all corporate traffic is carried on the backbone.

The company also uses the network to support all of its IBM Systems Network Architecture and other data networking needs, and it is moving rapidly to implement video services.

Welland said he is forced to stay on the leading edge of technology because of user demand. "If we don't [provide new services], the divisions will do it anyway," he said.

There was no magic in doubling the usage of the corporate network, Welland said, but he did get a significant boost from the AT&T Tariff 12 deal.

After looking at the Tariff 12 network AT&T had put together to satisfy a unique requirement for the Defense Department, Welland approached AT&T in 1986 to see if the carrier could design a network for GE.

AT&T was just coming out of its regulatory shell after divestiture and beginning to feel the pressure of competition for large business customers, Welland said. He was able to capitalize on these factors in persuading AT&T to develop the network.

The result was AT&T's first commercial Tariff 12 filing in 1987. In that filing, the company proposed the Digital Tandem Switched Network service, which

involved installing tandem switches dedicated to GE at AT&T network points of presence.

The electronic T-1-based tandem network consists of seven AT&T System 85 private branch exchanges at AT&T central office sites and five central office switches GE already owned. Together, the switches provide the tandem routing intelligence for GE locations, which are outfitted



GE's Stanley Welland

with a mix of PBXs and Centrex.

This network obviated the need for GE to make any capital investment and gave the company a single management point for the network.

"We decided we would rather manage AT&T than manage the facilities," Welland said.

The Digital Tandem Switched Network Service, the unique component of GE's network that was not available under tariff, was offered to Welland on a fixed-rate basis for five years. Switched services and private-line services offered to GE under Tariff 12 are obtained at rates from AT&T's Tariffs 1, 9 and 11.

Although no longer unique, another benefit GE realized by spelling out what the company wanted and letting AT&T see what it could come up with was the opportunity to be the first user of AT&T's Bandwidth Management Service.

GE wanted the ability to monitor and reconfigure its T-1 backbone, and AT&T devised the service to accommodate that need. Today, Welland uses a voice mail system to personally monitor all the trouble tickets generated by the company's Princeton, N.J., network control center.

Although facing some uncertainty concerning the fate of Tariff 12, which is currently under investigation by the Federal Communications Commission, Welland is confident the tariff will not be changed significantly (see "Common Carrier Bureau calls for Tariff 12 rejection," page 6). He said the FCC is not likely to reject the tariff because it would be too disruptive to the industry.

About 50% to 60% of GE's network is provided under Tariff 12. GE uses a number of other long-distance and local carriers for the remainder, Welland said. ■

Calendar

April 17-18, New Orleans — An Intensive Introduction to T1/T3 Networking. Contact: Data-Tech Institute, P.O. Box 2429, Lakeview Plaza, Clifton, N.J. 07015; (201) 478-5400.

April 17-19, Dallas — International Telecom Policies and Services. Contact: ICA, Suite 710, 12750 Merit Drive, Dallas, Texas 75251; (800) 422-4636.

April 17-19, New York — DB2 Tools Symposium. Contact: Digital Consulting, Inc., 6 Windsor St., Andover, Mass. 01810; (508) 470-3880.

April 17-19, Washington, D.C. — Open Systems Networking with TCP/IP: From Practice to Theory. Contact: Transfer Technology Institute, 741 10th St., Santa Monica, Calif. 90402; (213) 394-8305.

April 17-21, St. Louis — Fifth International Integrated Services Digital Networks Exposition. Contact: Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134; (617) 232-3111.

April 18-19, Amsterdam — Second International Conference on Telecommunications Policy and Regulations: The Agenda for the 1990s. Contact: IBC Technical Services, Ltd., Bath House, 3rd floor, 56 Holborn Viaduct, London EC1A 2EX; 444-1-236-4080.

April 18-20, Boston — Connect '89. Contact: Connect '89, P.O. Box 3833, 999 Summer St., Stamford, Conn. 06905; (203) 964-0000.

April 18-20, Orlando, Fla. — Data Base: A Manager's Guide. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402; (213) 394-8305.

April 18-21, Washington, D.C. — Ninth IC&C Executive Forum. Contact: International Computers & Communications, P.O. Box 17392, Washington, D.C. 20041; (703) 476-2604.

April 18-21, Washington, D.C. — Introduction to Software Engineering & CASE. Contact: Integrated Computer Systems, Suite 300, 8000 Towers Crescent Drive, Vienna, Va. 22180; (800) 421-8166.

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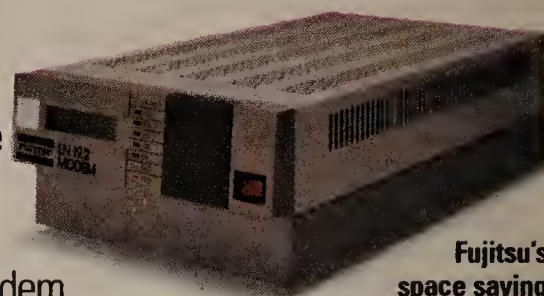
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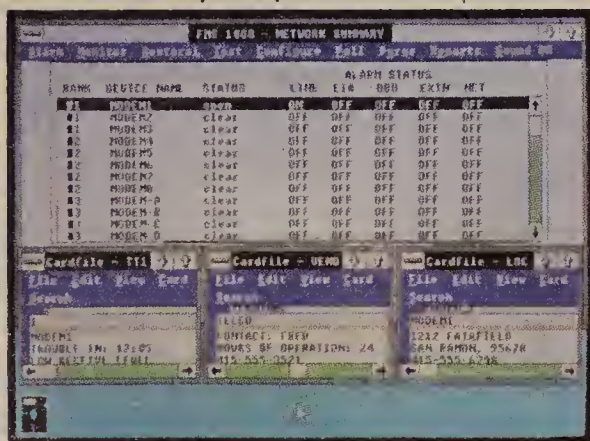
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